



**GREEN DREAMS
FROM BLENDED
WINGS TO MILL
WASTE BIOFUELS
ENVIRONMENT P30**

HANDLING RISK

The worrying capability gaps exposed by four fatal accidents that took place in the tropics **20**

TACTICAL RETREAT

Leaner Bombardier to divest NATO military flying training business in Canada to CAE **21**

FLIGHT

INTERNATIONAL

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3-9 FEBRUARY 2015

MANUFACTURING

SOUTH ON THE RISE

Why US aerospace industry is heading for its new heartland

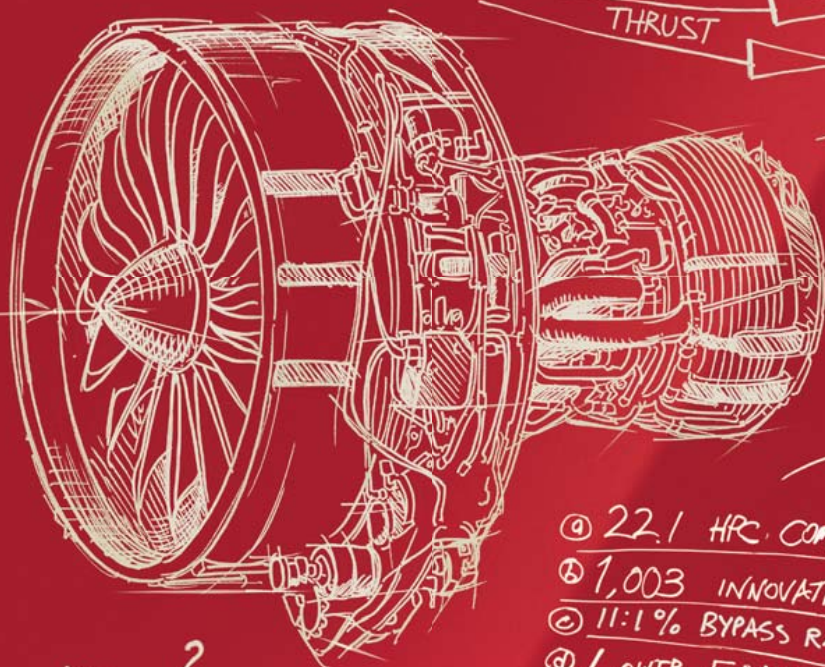


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COVER IMAGE

A 787 takes off from Boeing's factory in North Charleston, South Carolina – the company's only final assembly facility outside the Seattle area P26



BEHIND THE HEADLINES

Aerospace and Defence Reporter **Beth Stevenson** was in Paris for an annual results event with rotorcraft supplier **Airbus Helicopters**. The company reported fewer orders and deliveries than 2013, but a strong demand for heavy types (P10)



NEXT WEEK INDIA

Ahead of the Bengaluru air show, what are the big issues for India's airlines, industry and military procurement?

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Hybrid wing body concept could offer huge efficiency gains **P30**. Hawaiian to upgrade reporting software **P16**



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IMAGE OF THE WEEK

Antonov Airlines' An-225 "Mriya" touches down in Ostrava, the Czech Republic on 26 January, before a flight to deliver military vehicles produced by Excalibur Army to Africa. Powered by six Ivchenko-Progress D-18 engines and with a cargo capacity of around 250t, the aircraft was built in 1988

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Rex Features

THE WEEK IN NUMBERS

6.1%

Dubai Airports

Rise in people using Dubai International in 2014, making it the world's busiest airport for international passengers

\$124bn

Boeing Capital

Financing requirement for commercial jets in 2015, according to Boeing Capital, a subsidiary of the airframer

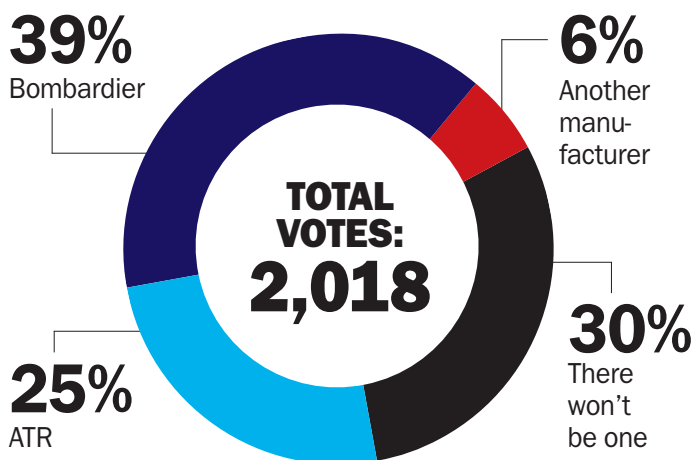
5

Flightglobal

Asia-Pacific destinations served by American Airlines, which plans on making Los Angeles its new hub to the region

QUESTION OF THE WEEK

Last week, we asked: **Who will launch a 90-seat turboprop first?**
You said:



This week, we ask: **Best Air Force One?**
☐ 747-8 ☐ 747-200 ☐ 707 ☐ Constellation ☐ A380

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723 Deliveries



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All together now...

Welcome advances in offshore helicopter safety in the UK North Sea sector are in prospect, but they could be threatened by economics unless the industry as a whole keeps its nerve

When offshore oil support helicopter operations in the UK sector suffered five serious accidents or incidents between 2009 and 2013, the Civil Aviation Authority's initial response was defensive. It dismissed the fact that the Norwegian sector – with a similar fleet and only slightly fewer operations – had suffered no serious accident since 1997 effectively as good fortune.

Nevertheless, the CAA rolled up its sleeves and conducted a thorough review of UK sector safety, which it then released early in 2014. What it found suggested that the UK/Norway difference was not pure luck.

The CAA found there was a huge amount that could and should be done to improve offshore helicopter safety. This included everything from practical measures to improved operating standards – but above all, better communication. The real difference between the sectors was that the Norwegians had long ago set up better reporting and information sharing systems, and

The rapid introduction of new equipment and procedures is supported by cultural change

had generated a real “we’re all in this together” culture that involved not only the operators, but the oil and gas industry they served. The British thought they had done that, but the system was not actually working.

With the release of a new and welcome progress report from the CAA, it is apparent that this is all changing. The commendably rapid introduction of new equipment and procedures to improve survivability and rescue in the event of ditching represents a huge advance, but even more encouraging is the culture change. The change in attitude to safety shines through



Keep in harmony, everyone

the CAA report's workaday prose in a remarkable way. The authority is clearly delighted to be able to report a rate of implementation that would be impossible without wholehearted co-operation.

Here we have an industry that in many respects led the world in offshore helicopter safety advances in the 1990s and early 2000s, but had gone into sleepwalking mode, ticking compliance boxes. Their heads were in it, but their hearts were not. Now, the oil and gas producers seem to be on board with the operators, and are all beginning to talk to each other.

The prospect of the Norwegian “we’re all in this together” culture transferring to the UK sector is real.

Understandably, the CAA is calling for “this remarkable momentum for change [to be] sustained”. However, at a time when oil prices have crashed and the oil companies are laying off employees in Aberdeen and Stavanger, their corporate instincts will be to look for more economies, so the CAA is going to have to keep its eye on the ball. ■

See News Focus P25

A positive outlook for the Dreamliner?

Boeing has spent a lot of money on the 787 programme. How long will it take to make a profit on the project, and do investors care if accounting rules allow it to declare a unit profit now?

The first answer is possibly unknown, even within Boeing. The only thing that is certain is that internal spending on parts and productivity improvements will rise by at least \$2.5 billion over the next nine months, and overall deferred production costs could exceed \$30 billion before the programme reaches breakeven.

For the second part, Boeing's shares jumped by 5% on 28 January, after investors learned that the 787 programme will become cash positive this year – even if the aircraft's unit cost still greatly exceeds its sale price.

Boeing accounts for 787 profitability at the programme level rather than the unit level, which allows it to show an operating profit on the balance sheet for each Dreamliner delivered. Investors can be satisfied with this policy as long as it continues to give Boeing the flexibility it needs to continue developing new projects, such as the 737 Max and the 777X, while meeting production rate commitments for current models.

There may be a limit, however, to how long Boeing can defer the breakeven point on the 787 programme before spooking investors. That critical milestone is currently set for roughly 12 months away, and the company would be wise to honour it. ■

See This Week P9



David Learmount offers his succinct views on the complexities of aviation safety: flightglobal.com/Learmount



BRIEFING

GULF CARRIERS SUSPEND BAGHDAD SERVICES

OPERATIONS Emirates and Etihad Airways have both suspended services to the Iraqi capital Baghdad until further notice, after an arriving Flydubai Boeing 737-800 sustained damage to its fuselage "consistent with small-arms fire". Local media reports suggest the targeted aircraft was operating flight FZ215 on 26 January.

SKYLON ENGINE CLEARS PRELIMINARY REVIEW

SPACEFLIGHT Reaction Engines has completed the preliminary requirements review for the Sabre hybrid rocket designed to power its single-stage-to-orbit Skylon spacecraft. A demonstration with a full-scale test engine will occur before 2020. Development work on Skylon began nearly six years ago, after the UK company received a development contract from the European Space Agency. It also has £60 million (\$91 million) in backing from the UK government.

SKYMARK SHARES DELISTED ON TOKYO EXCHANGE

FINANCE Japan's Skymark Airlines will be delisted from the Tokyo Stock Exchange on 1 March, following an announcement that it has filed for bankruptcy protection. Skymark says it has debts of ¥71 billion (\$603 million) and faces a possible penalty amounting to \$700 million for the cancellation of six Airbus A380s on order.

UKRAINE APPROVES AN-70 PRODUCTION START

AIRLIFTERS Ukraine has given its approval for the Antonov An-70 tactical transport to enter series production, through an agreement signed on 13 January. Flightglobal's Ascend Fleets database records Kiev as having already ordered three An-70s, with letters of intent signed for another two. Powered by Ivchenko-Progress D27 propfan engines, the type has a maximum payload capacity of 47t.

BOEING GETS INDONESIAN APACHE FUNDS

ROTORCRAFT Boeing has been awarded \$296 million to build eight AH-64E Apache attack helicopters for Indonesia, formalising a deal first outlined by US Defense Secretary Chuck Hagel in August 2013. Deliveries to the nation's army should conclude by February 2018, with the sale also including Lockheed Martin AGM-114 Hellfire air-to-surface missiles, personnel training and in-service support.

HATS LIFT OFF FOR AUSTRALIAN MILITARY

DEBUT Airbus Helicopters has performed a 57min debut flight with the first of 15 EC135 T2+ rotorcraft to be produced for the Australian military's Helicopter Aircraft Training System (HATS) programme. Canberra in November 2014 signed a deal with a Boeing Defence Australia/Thales team for the army and navy aircrew training system, which should commence student training activities during 2016.

SCOTLAND TO TAKE AXE TO AIR PASSENGER TAX

POLITICS Scotland's government will begin dismantling a controversial UK tax on air passengers once that power is devolved to Edinburgh, former first minister Alex Salmond says. Speaking at the British Air Transport Association dinner in London on 28 January, Salmond described the air passenger duty as "a millstone around the neck of this industry and the Scottish economy".

FIRST QANTAS 747-400 GOES TO MUSEUM

RETIREMENT Qantas will donate its first Boeing 747-400 to Australia's Historical Aircraft Restoration Society, which will open it for public display at Illawarra Regional airport, near Sydney.



Crown Copyright

The UK will miss its March target to have a seven-strong fleet

ORDERBOOK CRAIG HOYLE LONDON

Airbus chief acts on A400M delays

Military Aircraft head resigns over crisis affecting delivery of Atlas tactical transports, after Enders talks of consequences

Airbus has moved to end the instability affecting its A400M tactical transport programme, with the head of the company's Military Aircraft unit having resigned his post.

The departure of Domingo Ureña Raso – who had headed the programme for almost six years – was announced two days after chief executive Tom Enders had promised that production and delivery delays would have "managerial and organisational consequences".

Head of flight test operations Fernando Alonso will replace Ureña Raso from 1 March, with Airbus Defence & Space chief executive Bernhard Gerwert to oversee activities until then.

Under a wider restructuring outlined on 29 January, responsibility for the A400M's industrial activities will be transferred to Pilar Albiac-Murillo at Airbus's Operations unit. Existing programme head Rafael Tentor will retain responsibility for development and customer deliveries.

Enders had earlier apologised for the problems while speaking at an Airbus Group reception in London. "We have additional delays and I very much regret that we are unable to meet the commitments made to our customers several years ago," he said.

Airbus is unable to meet the UK Royal Air Force's schedule to declare initial operational ca-

pability with the Atlas next month. This was to have been achieved with seven aircraft, but so far just one has arrived at the service's Brize Norton base in Oxfordshire. A second was accepted in late 2014, but is having its defensive aids system equipment installed in Spain.

"I hope that in 2015 this [fleet] will grow to seven aircraft at least," Enders says.

Airbus delivered a combined 11 A400Ms in 2013 and 2014, and had expected to increase this to 23 in 2015, before launching a review in January.

Several additional capabilities will be integrated with the A400M in the second half of this year, Airbus says. "Additional military capabilities will be integrated up until 2018, as contractually agreed," it adds, describing discussions via Europe's OCCAR procurement agency as "intense and constructive". ■

A400M DELIVERIES

Nation	Delivered	On order
Belgium	–	7
France	6	44
Germany	1	52
Luxembourg	–	1
Malaysia	–	4
Spain	–	27
Turkey	2	8
UK	2*	20
Total	11	163

SOURCE: Airbus *1 in modification



Heavy demand lifts
Airbus Helicopters
THIS WEEK P10

PRODUCTION STEPHEN TRIMBLE WASHINGTON DC

Deferred costs delay 787 breakeven

Boeing misses cash positive target on Dreamliner programme, but insists long-term plans will pay off later this year

Breakeven on the 787 programme slipped further from Boeing's grasp in an otherwise profitable fourth quarter and 2014 overall.

At the beginning of last year, Boeing chief executive and chairman Jim McNerney projected that deferred production costs would peak at around \$25 billion by the end of 2014, signalling the programme's breakeven point on a unit basis.

Boeing surprised investors by hitting the \$25 billion mark in the third quarter, and the dubious milestone suggested that the programme was digging an even larger financial hole for itself before it can become profitable.

Three months later, those fears appear to have been realised. The delivery of the first 787 with a unit cost lower than the sale price is now projected to occur "shortly after" Boeing raises the production rate by 20% to 12 per month in 2016, chief financial officer Greg Smith said during an earnings call on 28 January.

Meanwhile, the 787 programme added another \$960 million in deferred production costs in the fourth quarter, raising the overall total to \$26.2 billion.

Smith warns that costs could increase at similar levels for the next two or three quarters. If that happens, the overall total could

rise to at least \$28.7 billion. By that time, Boeing will have delivered over 300 787s that cost more to build than their sale price.

Such per-unit losses do not show on its balance sheet, however. Accounting rules allow the company to determine the cost of a sale by pulling forward an average of projected profits over a predetermined block of aircraft, which in the case of the Dreamliner is 1,300 aircraft. This policy eases the fiscal strain on its balance sheet for pricey new aircraft development programmes.

If Boeing declared individual losses on the 114 787s delivered in 2014 based on the discrete costs of building each aircraft, its commercial aircraft division would have reported an overall operating loss of \$122 million

Boeing is hitting other key goals on the 787 programme

last year. Instead, the practice of bringing forward average unit profits over a production run of 1,300 aircraft on to current deliveries helped the division to instead post a \$6.4 billion profit.

Until the end of last year, Boeing never intended for the deferred production costs for the



The flagship twinjet's cash position should improve during 2015

787 programme to rise above \$20 billion. As costs continued to rise, Smith says the increases were necessary to overcome production problems as the rate increased to 10 aircraft per month and the -9 model entered final assembly. Boeing also decided last year to expand the programme's second final assembly line in North Charleston, South Carolina, leading to additional costs.

Deferred production costs were supposed to stabilise by the end of 2014, but continue to rise because of three main issues, Smith says. Finalising cost-saving new contracts with 787 suppliers has been postponed, the cost of building each aircraft is declining slower than expected and Boeing is mak-

ing investments to improve the reliability of the aircraft and productivity on its assembly lines, he says. "The things we're doing are all about driving profitability over the long term."

Despite the internal cost growth, Boeing is hitting other key goals on the 787 programme. Deliveries in 2014 exceeded the company's planned guidance, and a production bottleneck at the midbody join position in North Charleston early in 2014 was overcome.

Boeing still expects the 787 to become cash positive in 2015, which includes airline advances on 2016 deliveries and pulling forward average projected profits. ■

See Feature P26



Commercial Airplanes revenue rose by 13% year-on-year, to \$60bn

FINANCIALS

Bumper orders boost annual results

An increase in commercial aircraft deliveries propelled Boeing to a new record for revenues and backlog in 2014, according to financial results released on 28 January.

Overall revenues topped the \$90 billion mark for the first time, after growing by 5% from 2013. Operating profit also improved by 14% to \$7.47 billion, while net income jumped by 19% to \$4.59 billion.

The company's total backlog also grew by \$12 billion during the fourth quarter, to \$502 billion.

Commercial Airplanes revenue rose by 13% year-on-year to \$60 billion, as annual deliveries climbed by 12% to 723 aircraft.

Boeing has also issued guidance for its expected earnings and revenue in 2015. The company expects the Commercial Airplanes division to deliver 750 to 755 aircraft and tally \$64.5 billion to \$65.5 billion in revenue.

Total company revenues are forecast at between \$94.5 billion and \$96.5 billion. ■



INVESTIGATION CRAIG HOYLE LONDON

F-16D crash kills 11 at Spanish NATO exercise

Investigators are attempting to determine what caused a Greek air force Lockheed Martin F-16D to crash on to a busy ramp at Spain's Albacete air base during a NATO exercise on 26 January, leaving 11 military personnel dead.

Part of a large multinational detachment assigned to a NATO Tactical Leadership Programme (TLP) course that started at Albacete on 19 January, the Greek aircraft crashed soon after

having taken off, killing its two-man crew.

Two French air force pilots and seven ground support personnel died when the F-16 came down on a parked Dassault Alpha Jet trainer, with another five seriously injured.

Debris and a major blaze also injured 12 Italian air force personnel and left an Alenia Aermacchi/Embraer AMX with fire damage. Several other parked aircraft – including a second



Nine French personnel died when debris hit a parked Alpha Jet

AMX, a French Dassault Mirage 2000D and a US Air Force F-15E – are reported to have been struck by debris, and the USAF says eight of its personnel received minor injuries.

Aircraft and 750 personnel from Belgium, Denmark, France, Germany, Greece, Italy, Spain, the UK and the USA are participating in the TLP activity, which is due to run through 13 February. ■

DELIVERIES BETH STEVENSON PARIS

Heavy demand lifts Airbus Helicopters

Larger types made up for declining light single orders in 2014, with manufacturer expecting trend to continue this year

Airbus Helicopters has reported steady end-of-year results for 2014, with heavy-class helicopters continuing to dominate its orderbook.

Speaking in Paris on 27 January, chief executive Guillaume Faury said 2014 was “more or less stable in comparison to the previous two years”. A total of 471 aircraft were delivered, compared with 497 in 2013, 475 in 2012 and a record total of 588 recorded in 2008.

Of last year's total, 101 heavy-class rotorcraft were delivered: 53 NH Industries (NHI) NH90s and 48 Super Puma-family rotorcraft.

“It is a significant change in mix. There are lots of heavy helicopters required at the moment,” Faury says, adding: “I see this as a trend for a few years to come.”

Last year also was a “strong year” for the medium EC145 family, Faury says, with orders up to 115, from 61 in 2013. “We have certified, delivered and introduced into service three new helicopters,” he adds, referring to the 7t EC175, EC145 T2 and EC135 T3/P3 variants.

Overall, the company saw a slight decline in orders from 2013's total of 422, recording 402



The company delivered 48 Super Puma-family aircraft last year

sales in 2014. Based on its deliveries, Airbus claims the largest share of the civil and parapublic sector of the rotorcraft market, with 44%, and the fourth-largest military share, with 11%. However, NHI – in which Airbus has a majority share – holds an additional 6% of the latter market with the NH90.

Faury attributes the drop from a 46% share of the civil market in 2013 to a decline in light single helicopter orders, “in which we had a very strong market share”. He maintains that the company has a balanced portfolio,

with a 52% to 48% split between its civil and military business activities.

“We see lots of opportunities in 2015 for big military campaigns,” Faury says, noting that 2014 did not offer many such prospects.

Meanwhile, Faury confirms that NHI's orderbook has declined, with the company to perform “a backlog adjustment of 33 NH90s”.

This includes the formal removal of 23 aircraft from Spain's originally 45-strong commitment, and the cancellation of a Portu-

guese requirement for 10. A reduction in the number of German NH90s on order is not included, as negotiations on the contract change have not been finalised, but Qatar is expected to make a decision on a planned purchase of 22 NH90s in the next 12 months.

2015 will also see progress made with Airbus's medium-class X4 prototype, a full-scale model of which will be revealed at the Heli-Expo exhibition in Orlando in March. “X4 is already a reality – we have a prototype and this helicopter will fly in 2015,” he says.

Meanwhile, Faury comments: “The drop in [the price of] oil is affecting the aerospace industry. We have 15% of our business linked to oil and gas opportunities. There is pressure on cost... and exploration projects are being revised.”

Faury also notes that there has been “a drop in activity” due to political tensions between Europe and Russia.

The delivery of 15 EC175s to UTair Aviation has been suspended until the company receives “more clarity on what is going to happen”, he reveals. ■



737 crash followed
windshear errors
AIR TRANSPORT P12

SELECTION DAN PARSONS WASHINGTON DC

Boeing bags Air Force One deal as USAF elects 747-8i

Intercontinental jumbo variant to serve as next presidential airliner in sole-source contract

The US Air Force has announced that Boeing's 747-8 Intercontinental airliner will serve as its next-generation Air Force One platform, with up to three examples to be specially outfitted to carry the US president.

Air Force Secretary Deborah Lee James says "the 747-8 is the only aircraft manufactured in the United States that, when fully missionised, meets the necessary capabilities established to execute the presidential support mission". The air force announced the selection on 28 January, but has not yet formalised a contract.

When USAF officials launched the presidential aircraft recapitalisation programme more than a year ago, they considered holding a competition to select a contractor to transform the civilian airliner's interior and systems into Air Force One. The service now intends to award Boeing a sole-source contract to modify the aircraft with subsystems that "must seamlessly interface with each other and the 747-8 aircraft



Three jets will replace a pair of 747-200s, designated as VC-25As

systems in order to meet the presidential 'no fail' mission". Air force documents say other companies "would face significant challenges" with securing US Federal Aviation Administration approval for the completed aircraft.

The 747-8s will replace a pair of 747-200s, designated as VC-25As. These were delivered as the last two -200s off the production line in 1990. Boeing will manage, test, certificate and provide pre-operational training for the new fleet.

The announcement is a boost for Boeing's commercial production line for the 747-8, which is

exclusively powered by General Electric GENx-2B engines. At current rates, the company was to deliver the last 747-8 now under contract in early 2017. Unless Boeing receives further orders for the passenger or freighter versions, the USAF would need to finalise a contract by the end of 2015 to avoid a costly break in production.

In 2007 the USAF approached Airbus for information about the A380. The European company subsequently declined to offer the superjumbo for a competition, saying it would be impractical to set up a final assembly capability for the type in the USA. ■

INVESTIGATION

Missing MH370 formally declared as an accident

Malaysia's government has officially declared the disappearance of Malaysia Airlines flight MH370 as an accident, confirming the loss of all 239 passengers and crew.

The search for MH370 has failed to turn up any sign of the Boeing 777-200ER, which vanished en route from Kuala Lumpur to Beijing on 8 March last year. Department of civil aviation chief Azharuddin Abdul Rahman says that based on all available evidence, survivability was "highly unlikely".

Investigators intend to release an interim report in early March, but Azharuddin notes that safety and criminal inquiries into the loss have been "limited by a lack of physical evidence".

Malaysia Airlines is ready to "proceed immediately" with the next stage of the compensation process following the formal declaration, he adds. ■

The search for MH370 has failed to turn up any sign of the 777

OUTPUT STEPHEN TRIMBLE WASHINGTON DC

Gulfstream to throttle up midsize production rates

Gulfstream plans to boost production of "green" midsize business jets by nearly one-third this year, according to Phebe Novakovic, chairman and chief executive of parent company General Dynamics.

The manufacturer delivered 29 super-midsize G280s and midsize G150 business jets in 2014, Novakovic said during an earnings call on 28 January, adding that output will rise by 10 aircraft this year. Production of the large-cabin G650, G550 and G450 will remain stable, with 115 green aircraft deliveries.

The midsize rate increase puts pressure on Gulfstream's operat-

ing margins, as the smaller jets are less profitable than large-cabin types, Novakovic says. Operating profit is also under pressure, with rising spending on research and development for two new aircraft launched last October – the G500 and G600.

Although large-cabin jet production will not increase in 2015, Novakovic says Gulfstream sees strong demand for the three types still in production. "We really haven't seen much impact on the emerging market," she says. "North America remains very strong, [as well as] Asia-Pacific. We are also seeing some increased demand in the Middle East."



The business aircraft manufacturer delivered 29 G280s last year

Gulfstream's production backlogs are also healthy. The first availability for a newly-built G650ER remains the first quarter of 2017.

The G550 and G150 production lines are sold out until early 2016, and the G450 and G280 assembly lines are sold out until the end of this year. ■



INVESTIGATION DAVID KAMINSKI-MORROW LONDON

737 crash followed windshear errors

Report states pilots of Bhoja Air -200Adv that came down in April 2012 were confused by autopilot's response to downburst

Pilots of a Bhoja Air Boeing 737-200Adv persisted with a turbulent approach to Islamabad airport that entailed penetrating an active squall line, and failed to respond correctly to windshear and stall warnings. The jet crashed on 20 April 2012 some 4.2nm (7.8km) short of runway 30.

According to the recently-published official report, the captain of the aircraft (AP-BKC), inbound from Karachi, was aware of thunderstorms at the destination but decided not to divert, voicing an intent to find gaps between storm cells. When the aircraft approached the line the captain realised that the gaps were few and small, but he persisted.

Pakistan's Civil Aviation Authority states that the aircraft entered a storm cell as it was intercepting the localiser and



None of the 121 passengers and six crew survived the incident

glideslope for an instrument landing system (ILS) approach. When the 737 encountered windshear associated with a downburst, the autopilot pitched up, the airspeed dropped, and it

descended from 1,900ft above ground to 900ft within 4s.

Windshear alarms triggered, but the crew "did not take any remedial action". Cockpit recordings show the captain, who was

flying, "yelling in extreme anxiety and desperation".

The investigation noted that the pilots had not been given windshear training, and although the copilot was rated on the 737-200, he was not rated on the more highly automated -200Adv.

The captain also had a training history of struggling with automation, says the report, so both pilots were confused by the reaction of the autopilot and auto-throttle to the windshear.

During the final few seconds of flight, it states, the captain was making "desperate control column input for survival" while the first officer called for go-around, but he did not take control. After encountering a second downdraft the aircraft hit the ground short of the runway threshold.

None of the 121 passengers and six crew members survived. ■

FLEET AARON CHONG SINGAPORE

JAL proud to fly flag as it firms order for MRJs

Japan Airlines (JAL) has firmed up an order with Mitsubishi Aircraft for 32 MRJ regional jets, after signing a letter of intent in August 2014.

The carrier will deploy the MRJs from 2021, to be operated by its wholly-owned regional subsidiary J-AIR.

"As a network carrier that also operates regional jets, we are contributing to the birth of Japan's first passenger jet," says JAL president Yoshiharu Ueki.

The Japanese airframer's order-book for the MRJ now stands at 407, which includes 223 firm orders, 160 options and 24 purchase rights.

Flightglobal's Ascend Fleets database shows that J-AIR operates nine Bombardier CRJ200s and 15 Embraer E170s. It also has orders for five E170s and 10 E190s. ■

RESTRUCTURE STEPHEN TRIMBLE WASHINGTON DC

UTC splits PAS to streamline costs

Dissolving the two-year-old Propulsion and Aerospace Systems (PAS) organisation is a key part of United Technologies' strategy to recover from currency fluctuations, says chief executive Gregory Hayes.

Alain Bellemare, formerly head of PAS, has left the company as the organisation is dismantled. The two major businesses within PAS – Pratt & Whitney and UTC Aerospace Systems – will continue operating as standalone businesses reporting directly to Hayes.

The rising strength of the dollar against currencies such as the euro has prompted UTC to lower its sales forecast for 2015 from \$67 billion to \$66 billion. UTC on 26 January reported annual sales of \$65.1 billion in 2014, a 4% increase on the previous year.

As a result, UTC is being internally restructured to reduce corporate support and overhead costs, says Hayes.

The PAS unit was established following UTC's acquisition of Goodrich, which was combined with Hamilton Sundstrand under the new UTC Aerospace Systems (UTAS) segment. The leaders of UTAS and P&W reported to Bellemare, who reported to Hayes.

Under Bellemare, the PAS structure delivered \$400 million out of a planned \$500 million in operational synergies by combin-

ing the former standalone Hamilton Sundstrand and Goodrich businesses, Hayes says.

The reorganisation comes as P&W prepares to launch a significant production ramp-up on the PurePower PW1000G geared turbofan engine family. Two versions of the engine are scheduled to enter service later this year with the Airbus A320neo and the Bombardier CSeries. ■



The PW1000G is due to enter service with the A320neo this year

“

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MODIFICATION MICHAEL GUBISCH LONDON

Work begins on A320 P2F conversion

MRO provider Haitec receives aircraft for prototype work in programme PacAvi aims to expand to 50-60 conversions a year

Work on the first Airbus A320 passenger-to-freighter conversion has begun at German MRO provider Haitec Aircraft Maintenance under a programme led by US engineering and asset management firm Pacific Aviation & Lease Management.

San Diego-headquartered PacAvi Group launched its "A320/A321 Freighter Lite" programme in September 2014 and is collaborating with aftermarket specialists – including Haitec, US-based AeroTurbine and China's Guangzhou Aircraft Maintenance Engineering – on the conversion work.

A 1992-vintage A320 (MSN 293) has been inducted into Haitec's facility at Hahn airport to serve as prototype for the conversion programme, with the aim of gaining supplemental type certification (STC) from the European Aviation Safety Agency and US Federal Aviation Administration in 2016, PacAvi says.



Airbus scrapped its own passenger-to-freighter scheme in 2011

The CFM International CFM56-5A1-powered twinjet was initially delivered to Air Malta, later transferred to Air Mediterranée, and was last operated by Greece's Hermes Airlines in 2014, Flightglobal's Ascend Fleets database shows.

Netherlands-based lessor and AeroTurbine parent AerCap was the main customer for Airbus's own passenger-to-freighter programme for A320s and A321s – a

programme that was scrapped in 2011, three years after its launch and just before work started on the first aircraft.

That initiative was a joint venture with Russian aerospace firms United Aircraft and Irkut, with the latter acting as conversion centre. However, some aircraft, including the prototype, were going to be modified at Airbus Group's conversion centre EFW in Dresden.

Once the STC has been granted, PacAvi aims to "dominate" the A320/A321 passenger-to-freighter market which, it says, will generate 50 to 60 conversions a year. Haitec plans to modify around 12 aircraft a year, while AeroTurbine's MRO facility in Arizona will also convert aircraft. Passenger-to-freighter conversions of Boeing 757s have already been conducted at that Goodyear site.

GAMECO is the "latest addition" to the "global family of freighter conversion partners", says PacAvi chief executive Stephan Hollmann. When the STC has been issued, he says, "our plan is to grow fast".

Under the programme, both A320s and A321s will be equipped with a 121in (307cm) wide main deck cargo door just aft of the forward left passenger entry. While the A320 will accommodate 10 unit load devices on the main deck, the A321 is to hold 13. ■

POLICY MAVIS TOH JAKARTA

Safety ratings for Indonesia

Indonesia's transport ministry says it will introduce a safety rating on carriers in the country, following the crash of Indonesia AirAsia flight QZ8501.

Transport minister Ignatius Jonan says the policy is being prepared and details will be announced next month. Under the new system, airlines will be inspected every three months, with their ratings published.

The aim is to raise flight safety levels in the country, Jonan says. The minister has taken a tough stance on flight safety since the crash of the Indonesia AirAsia Airbus A320 into the Java Sea on 28 December.

Earlier this month the transport ministry also moved to increase domestic ticket prices, in a bid to boost flight safety. ■

RENEWAL MAVIS TOH JAKARTA

Sriwijaya sets out to double fleet size with 737-800, Max replacing Classic

Sriwijaya Air is working on a fleet renewal plan that will see its ageing Boeing 737 Classics phased out by 2018.

Speaking to *Flight International* during an interview in Jakarta, Sriwijaya's corporate planning and business development director Jefferson Jauwena said the Indonesian carrier is looking to

add at least six 737-800s to its fleet every year.

The carrier has already signed lease agreements for three -800s which will be delivered in the first half of the year. It is also in negotiations for more aircraft.

"We will replace the Classics in stages carefully," Jauwena says. "We don't want to over-

heat... there are some markets where we still need the Classics."

He adds that Sriwijaya envisions doubling its fleet size, but stresses that this will have to be done gradually. Beyond the -800s, the carrier also plans to add the 737 Max to its fleet.

Jauwena says Sriwijaya managed to turn a profit in 2014, though he declines to give details. This was achieved after the privately-owned carrier underwent a restructuring that saw it right-size the aircraft on some routes and cut loss-making ones.

Flightglobal's Ascend Fleets database shows that Sriwijaya operates a fleet of 38 737s, including 15 -500s, 12 -300s and six -800s. The average age of its fleet is 23 years. ■



The Indonesian carrier currently operates 15 737-500 twinjets



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TESTS MICHAEL GUBISCH LONDON

DLR cuts the ice with supercool droplet research

German aerospace research centre DLR is conducting windtunnel tests on anti-icing systems intended to make aircraft more fuel efficient.

On most commercial jets, bleed air from engines is used to heat leading edges of wings, horizontal and vertical stabilisers and engine air intakes. But some types, such as the Boeing 787, are equipped with electrically-heated surfaces to prevent ice build-up, which reduces the aerofoils' capability to produce lift while drag and weight are increased.

However, existing anti-icing systems "consume just too much energy" and thus reduce aircraft range, says DLR engineer Christian Mendig.

One alternative is to mechanically break off ice by inducing vibrations to critical surfaces. Another would be to adopt flexible materials that can be stretched to dislodge any ice. That principle is already applied on certain propeller aircraft. Scientists are also investigating special surface coatings to prevent ice formation.

Together with a technical university in Brunswick, DLR is trialling scaled aerofoils in a wind-tunnel inside a low-temperature chamber about the size of a domestic living room. This allows spraying of the test specimen with supercooled water droplets of up to 3mm in diameter.

The project, dubbed "Supercooled Large Droplets Icing", represents an effort to learn more about how ice builds up on aircraft surfaces. When droplets hit aircraft surfaces in the atmosphere, part of the water freezes immediately, while the remainder forms a layer that flows downstream before solidifying. The scientists want to determine where, and in what quantity, ice builds up in a compacted layer as opposed to a lighter, coarser layer.

"This would allow [us] to melt or detach ice in targeted areas without wasting energy in places with no icing," Mendig says. ■

DELIVERIES MAVIS TOH SINGAPORE

PAL, Airbus agree extended delivery schedule for A321s

Philippines carrier to receive the 38 twinjets it has ordered staggered through until 2024

Philippine Airlines (PAL) has confirmed it is "negotiating the deferment and staggering the schedule of delivery" of the 38 Airbus jets it has on order.

The carrier says it has 38 A321s scheduled to be delivered from 2015 through to 2020, and that it is negotiating to extend the delivery phase until 2024.

PAL also confirms that it will only take delivery of five A321s this year, down from an original plan to receive 10.

Local media reports quote its president Jaime Bautista as saying Airbus has "agreed in principle" to the deferment, and that it will be done without a penalty.

It is unclear whether the airline has plans to sublease some of the aircraft in its existing fleet.

Flightglobal's Ascend Fleets database shows that the carrier has 20 A321s and 18 A321neos on order. The jets are scheduled to be built from 2015 through to



The carrier will now take five of the type this year, instead of 10

2022. Last December, Bautista told Flightglobal that the airline's fleet of aircraft could be further utilised, and that it was finalising its network plans before deciding on how many aircraft to defer or sublease.

Under San Miguel Corporation's leadership, PAL had placed orders for 64 Airbus jets, comprising 44 A321s and 20

A330s. The Lucio Tan group has since regained full control of PAL, after buying out San Miguel's 49% stake.

PAL currently operates a fleet of 52 aircraft made up of A320 family jets, A330s and Boeing 777-300ERs, mostly on services within the Asia-Pacific region and also to the USA, London and the Middle East. ■

TECHNOLOGY STEPHEN TRIMBLE WASHINGTON DC

Hawaiian upgrades location software

Hawaiian Airlines will upgrade its widebody fleet with software that will report position data every few minutes.

The upgrade is based on an electronic flight bag developed by Honolulu-based WxOps and branded the OpsTablet and the Inmarsat Swiftbroadband satellite system.

Upgrades will begin in the second quarter. The cockpit-mounted OpsTablet will connect in-flight to an aircraft server and an internet protocol-based Always-On satellite transceiver for worldwide internet connectivity.

The system will automatically update flight crews and dispatchers on the aircraft's position, sys-

tems data, fuel status and aircraft-collected meteorological data.

"The results are expected to lead to more economical and accurate flight monitoring and turbulence avoidance," says Hawaiian Airlines manager of systems engineering Daniel Smith.

Hawaiian operates 19 Airbus A330-200s, nine Boeing 767-300ERs and two 767-300s, according to Flightglobal's Ascend Fleets database.

Hawaiian's inter-island fleet of 18 Boeing 717-200s – also will be connected. The OpsTablet in the carrier's 717 cockpits will "initially" rely on cellular data to pass data before take-off roll, then switch to an onboard aircraft communications and addressing reporting system in flight. ■



OpsTablet will report an aircraft's position, fuel and systems data

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Targeting a high altitude skills gap
NEWS FOCUS P20



The manufacturer believes fleet retirement schedules will help boost the prospects of the ATR 42

REGIONALS OLIVIER BONNASSIES LONDON

US deal would give big lift to ATR's smaller turboprop

After record 2014, manufacturer looks to elusive market breakthrough with lessor NAC

ATR may have closed another year without a North American customer, but chief executive Patrick de Castelbajac has revealed US interest in its 50-seat turboprop.

He says the company's largest customer, Nordic Aviation Capital (NAC), which ordered 25 ATR 42-600s with 50 options at last year's Farnborough air show, is in discussions with a possible operator. "They [NAC] are seeing a US customer... who has an interest in the ATR 42-600 model," he says.

Placing an aircraft in North America would be a major coup

for the Franco-Italian airframer, which enjoyed a record 2014 in terms of orders and deliveries, albeit with most of its success in the growing Latin American and Asian markets.

Of its 160 orders, 27 were for the smaller ATR 42 variant.

NAC, which also has a large exposure to the ATR 72-600 model, sees the ATR 42-600 as an aircraft for niche applications that may not appeal to all lessors.

At Farnborough, NAC chairman Martin Moller said he had a "good idea" where half the ATR 42-600 order will be placed, as

the lessor expects a solid demand in the 30-50-seat market as well as additional capacity.

ATR estimates that worldwide there are 900 regional aircraft of below 50 seats, aged more than 15 years on average.

"NAC... know that in the next 10 years, about 900 aircraft below 50 seats will reach retirement age," says de Castelbajac.

The ATR 42-600 model has amassed a total of 55 firm orders, with Air Tahiti committing first in December 2008.

NAC represents 31 units, or 56% of the programme. ■

PROGRAMME
DAVID KAMINSKI-MORROW LONDON

MC-21 'interest' from Lufthansa is talked down

One of the year's strangest potential aircraft order reports has been firmly quashed by sources close to Lufthansa.

According to Russian deputy prime minister Dmitry Rogozin, the German flag-carrier has been interested in the Irkut MC-21. He made the remark while briefing prime minister Dmitry Medvedev about the country's air transport manufacturing industry.

The MC-21 is said to have 175 firm orders including "serious" foreign operators

During the discussion, Rogozin informed Medvedev that the MC-21 had secured 276 commitments including 175 firm orders, but added that the "most interesting" aspect was the number of orders from "serious" companies, including foreign operators such as Lufthansa.

While Lufthansa declines to comment, a source familiar with the carrier's fleet planning states it is not interested in the MC-21 and has disclosed in detail its acquisition plans for the next few years.

Rogozin did not clarify his remark. He updated Medvedev on the development of the initial 180-seat variant of the MC-21 and said its first flight was expected around April 2016. ■

DELIVERY

American Dreamliner becomes reality

American Airlines has taken delivery of its first Boeing 787-8, joining United Airlines as the second operator of the Dreamliner in the USA. The US carrier will introduce the 787 on domestic routes in the second quarter – most likely between its hubs – before it is shifted to international routes. American had planned to take the aircraft in November 2014 but delays with certifying the seats pushed delivery back to this year. The delivery of its second 787-8, which was also scheduled for late 2014, is expected to occur in the next few weeks. The carrier has 14 more -8s and 26 787-9s on firm order.



TRAINING DAVID LEARMOUNT LONDON

Targeting a high altitude skills gap

Similarities between Indonesia AirAsia crash and a number of other incidents reveal a worrying capability deficiency

Accidents involving aircraft cruising through tropical or sub-tropical zones – like Indonesia AirAsia flight QZ8501 last December – are happening often enough now for the industry to have cause to refresh pilots on the risks. There have been three other accidents in similar circumstances over the last 10 years.

When the Air France flight 447 accident report was published in 2012, French accident investigator BEA warned of the need to prepare pilots for high altitude aircraft handling.

Comparisons with the recent Indonesian Airbus A320 accident have highlighted that this remains an apparent area of operational weakness.

But with Indonesian accident investigators having formally stated that they will not publish a preliminary factual report about flight QZ8501, it could be up to two years before operators know whether BEA's concerns are reflected in this case.

COMPARISON

All three of the accidents within the last 10 years that merit comparison with the QZ8501 incident over the Java Sea also took place during cruise in tropical/sub-tropical zones, and in all cases the crews were manoeuvring to avoid bad weather.

In all four cases control was lost, and none of the crews made an emergency call.



QZ8501 crashed into the Java Sea on 28 December.

Before the Indonesia AirAsia crash, there was the Swiftair/Air Algerie McDonnell Douglas MD-80 loss over Mali last July, Air France Airbus A330 flight AF447 over the South Atlantic in June 2009, and West Caribbean Airways' loss of an MD-80-series aircraft over the Caribbean Sea in August 2005. Between them, these resulted in the deaths of a combined 666 passengers and crew.

Looking back further into the archives, jet accidents with this combination of circumstances did not happen, even though flights in those days were just as likely to have to been made through the tropics as they are today.

Tropical weather seems to be a "modern" accident trigger, in the same way that loss of control in flight is now accepted by ICAO as

the greatest aviation risk to life, when before the 1990s it was not.

There is an uncanny similarity between the onset of problems in the Indonesia AirAsia and Air France cases. Both crews suddenly selected a nose-up attitude that gave them a rapid rate of climb – estimated to have been 6,000ft/min in the case of the A320, and known to have been 7,000ft/min for AF447 – at an altitude where demanding such performance from the aircraft was unrealistic.

In the Air France case the aircraft was in a full stall within 46s, and the crew did not apply stall recovery procedures.

When it published pilot training recommendations in the AF447 official accident report, BEA called for a list of actions to be implemented.

These include training in stall recovery at high altitudes as well as low, practising flying in alternate and direct control law as well as normal law close to the edges of the flight envelope, carrying out flying exercises to test whether pilots understand aerodynamics in practice, as well as in theory, and introducing more surprise events into recurrent training scenarios to prepare pilots – both individually and as a crew – to react calmly to the unexpected.

These four crashes resulted in the deaths of a combined 666 passengers and crew

Pilots are instructed not to disconnect the autopilot at high altitudes for good reason: with reduced vertical separation minima applying above 29,000ft in most parts of the world now – and handling being a delicate matter at high altitude – manual flying is banned there.

BEA pointed out, however, that if the automatics trip out, as they did in the case of AF447, the pilots have no choice, so they should be reminded in the simulator of what handling is like up there.

Pilots talk on Internet forums about "Coffin Corner"; a term applied to an aircraft's narrowing flight envelope when it approaches the high altitude edges of its performance capabilities.

But according to the BEA, they need to be reminded of what to do if the edges are actively breached, because recovery is almost always possible if the correct procedures are applied. ■

David Learmount offers his views on aviation safety issues: flightglobal.com/learmount



AF447's flight data recorder revealed poor handling decisions



**Sofia plans to exit
Russian MiG-29
maintenance pact**
DEFENCE P22

PRODUCTION STEPHEN TRIMBLE WASHINGTON DC

Boeing, Lockheed track Hornet sensor demand

Industry partners Boeing and Lockheed Martin will seek to develop an export market for theIRST21 infrared search and track pod, after gaining production approval from the US Navy.

The USN plans to operate the pod – which it designates as the ASG-34(V)1 – on the F/A-18E/F Super Hornet, pairing the passive, long-range seeker with its Raytheon APG-79 active electronically scanned array radar to identify and track aerial targets.

Production approval from the USN clears the Boeing/Lockheed team to launch low-rate initial production (LRIP) of the IRST system. An order for a first lot was due to go on contract in late January, with the equipment to



Lockheed Martin

The navy plans to buy 170 ASG-34(V)1 pods for its F/A-18E/Fs

be delivered in fiscal year 2017. An LRIP II deal should also be signed in the fourth quarter of this year.

In total, the navy plans to buy 170 ASG-34(V)1 pods, which are mounted under the Super Hornet's fuselage in the forward

tip of its centreline fuel tank. Instead of permanently integrating the sensor within the fuselage structure, this configuration will enable the service to move the sensors between aircraft as needed, says Boeing.

The USN's first 60 units will

update the technology Lockheed developed for the AAS-42 IRST pod formerly carried by Grumman F-14Ds, says Paul Hey, the company's capture manager for IRST21. A second block of 110 pods will add detection range and advanced processing, he adds.

Boeing's only export customer so far for the Super Hornet is the Royal Australian Air Force, which operates 24 F/A-18Fs and will also introduce 12 EA-18Gs.

"We have shown the IRST capability to lots of people," says Mark Gammon, a Boeing senior manager of F/A-18 innovation and growth. "A lot of work has gone on with the US Navy and US government to define the export policy." ■

ACQUISITION STEPHEN TRIMBLE WASHINGTON DC

CAE to buy Bombardier training arm

Simulation specialist will become prime contractor on NATO Flying Training in Canada programme through \$15.9m deal

Training and simulation specialist CAE is to buy Bombardier's military aviation training business for C\$19.8 million (\$15.9 million).

Announced on 26 January, the planned purchase will make CAE the prime contractor in charge of the NATO Flying Training in Canada (NFTC) programme in Moose Jaw, Saskatchewan and Cold Lake, Alberta.

Established in 2000, the NFTC programme delivers basic and advanced training for prospective fighter pilots of the Royal Canadian Air Force and several allied nations.

CAE says it will become wholly responsible for operating

base facilities and delivering both ground-school classroom instruction and simulator training once the deal is finalised later this year.

Bombardier's military training division employs 200 workers at the NATO training centres, which also deliver live training using an active fleet of 25 Beechcraft T-6As and 16 BAE Systems Hawk 119s.

In addition to Canada, pilots from the air forces of Austria, Denmark, Hungary, Italy, Saudi Arabia, Singapore, the United Arab Emirates and the UK currently use the system, or have previously sent students and/or instructors.



Royal Canadian Air Force

Basic instruction is delivered using 25 Beechcraft T-6As

"We plan to expand the NFTC programme, and leverage our new capabilities into future integrated training system programmes worldwide," says CAE

chief executive Marc Parent. Bombardier says the sale – which it expects to close by year-end – will allow it "to further focus on its core business areas". ■

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SERVICEABILITY

NH90 struggles to deliver goods for Finnish army

The Finnish army is within weeks of receiving its last of 20 NH Industries NH90 transport helicopters, but its chief of aviation has revealed it is currently achieving an approximately 40% operational serviceability rate with the type.

"The serviceability and the availability of [the] NH90 has been a big challenge," Lt Col Tuure Lehtoranta told Defence IQ's International Military Helicopter conference in London. At one point in 2014 the serviceability rate reached a low point of 19%, he adds. Lehtoranta says the availability of spare parts is one factor behind the low figures, and refers to an average 200-day turnaround as being "totally unacceptable".

Current availability rates take into account that five aircraft per year are undergoing retrofit, and he says the service hopes to boost its figures to 50% over the next three years.

Finland has recorded some 7,000 flight hours on the type, making it one of the more experienced operators of the 13 nations that have ordered the rotorcraft. ■



Flightglobal's MiliCAS database records the nation's air force as having 15 of the type in active use

NEGOTIATIONS BARTOSZ GLOWACKI WARSAW

Sofia plans to exit Russian MiG-29 maintenance pact

Bulgaria in talks with Poland's WZL-2 for overhaul work, but fears backlash from Moscow

Bulgaria is in negotiations to shift the maintenance of its RAC MiG-29 fighters from Russia to Poland's Military Aviation Works No. 2 (WZL-2) in Bydgoszcz, defence minister Nikolai Nenchev has announced.

"We must pay three times more than the manufacturer determined, because spare parts are crossed over by a few middlemen," Nenchev said of the current arrangement with Russia during a report aired on Bulgarian televi-

sion channel BNT1. Sofia has also received support of a lower quality than expected, he adds.

Nenchev expects a deal to be in place with WZL-2 by September 2015, when its current agreement with Russia will be terminated.

"WZL-2 has very good capabilities, which guarantee the fulfilment of Bulgarian air force procedures and standards," says Nenchev, who adds that he is concerned Moscow "will try to

disturb the acquisition of spare parts" for its aircraft. Flightglobal's MiliCAS database records the service as having 15 of the type in active use, including UB-model trainers.

"Talks with the Bulgarian air force were held from autumn 2013, and both partners gained mutual confidence," says WZL-2, which is expected to provide maintenance and overhauls for six MiG-29s to be involved in NATO air policing missions. ■

ACQUISITIONS ARIE EGOZI TEL AVIV BETH STEVENSON LONDON

Nigerian Cobra request shot down by Washington

Washington has blocked any sale by Israel of surplus US-made weapons systems to Nigeria, and indicated that Israeli-made equipment also should be exported to the country only "under strict conditions".

Nigeria had shown interest in buying surplus Bell AH-1 Cobra attack helicopters that were retired by the Israeli air force in 2013. Flightglobal's Ascend Fleets database records the service as having 37 E-, F- and S-model examples in storage.

Lagos was also looking at potentially acquiring additional unmanned air vehicles, beyond the Aeronautics Defense Systems Aerostars it purchased in 2006.



Lagos had shown interest in Israel's surplus AH-1 helicopters

A source familiar with the process says negotiations had begun, but that Israel's defence ministry ordered a stop following a request from Washington, which does not want any involvement in the battle between the Nigerian military and Boko Haram militants.

Speaking at Defence IQ's International Military Helicopter conference in London on 21 January, Nigerian air force chief of policy and plans Air Vice-Marshal AA Zannah said the service's limited rotary capability – including Mil Mi-24/35 attack helicopters – has

proven detrimental in its fight against Boko Haram.

"Our modest efforts against terrorism and counter-insurgency have their challenges," Zannah says. "Our problems have been multiplied." The service is establishing six forward operating bases near conflict-affected areas to deliver a slight improvement in response time, he adds.

Nigeria also operates Mi-17 transports, and is looking to acquire a number of upgraded Mi-171SH examples.

It also plans to weaponise and fit cameras to its AgustaWestland AW109 utility helicopters, but has "an inadequate" number of rotorcraft, Zannah says. ■



Diamond set for certification of DA62
BUSINESS AVIATION P24

TESTING DAN PARSONS WASHINGTON DC

USAF criticised over KC-46 schedule

DoD report predicts operational testing to start 12 months late, but Boeing insists 767 variant work remains on plan

Operational testing of the Boeing KC-46 aerial refuelling tanker is expected to begin at least one year later than originally planned, according to a report by the US Department of Defense's director operational test and evaluation (DOTE).

"Readiness for the scheduled start of [the initial operational test and evaluation phase] continues to be high-risk, with a 12-month delay expected," says the DOTE's annual report. An estimated six- to 12-month slip against the schedule laid out in the tanker's post milestone-B test and evaluation master plan had been detailed in its previous publication, for 2013.

The new report also calls into question whether a deadline for Boeing to deliver 18 of the 767-variant aircraft to the US Air Force in 2017 will be met.

"It is unlikely that Boeing and the air force will develop a schedule that delivers 18 different certified receiving aircraft prior to the start of familiarisation training for the [initial test and evaluation phase]," it says. As a result, the DOTE recommends that both parties agree on a "realistic schedule" for aircraft delivery and testing.

Boeing notes that since the report was drafted several months ago it has resolved an aircraft wiring issue and hastened the delivery of aircraft ahead of initial testing. It also conducted the first flight with the programme's lead engineering and manufacturing development aircraft in December; five months behind schedule. The 767-2C was not outfitted as a tanker.

"We are working with the air force to ensure we have a realistic



Eighteen combat-ready tankers should be in use by late 2017

schedule that allows us to complete the necessary test requirements moving forward," Boeing says, adding that it "remains on plan to deliver the initial 18 combat-ready KC-46A tankers in 2017."

The USAF says that an integrated test team made up of uniformed and Boeing personnel is planning an incremental approach to initial operational test and evaluation as the aircraft become available. ■



Seoul is expected to acquire 40 of the amphibious assault type

ROTORCRAFT GREG WALDRON SINGAPORE

Flight debut for Marine Surion

Korea Aerospace Industries has conducted the first flight of a Surion transport helicopter optimised for amphibious assault operations. Performed at the company's Sacheon site on 19 January, the 30min debut included ground tests, hovering and forward and backward flight.

The new variant has been developed for the Republic of Korea Marine Corps, which will use it to transport troops and equipment. New design features include foldable main rotors and an

emergency floatation system for use when ditching in water.

KAI, which has valued its development programme at 800 billion won (\$738 million), says the variant will be tested in a range of environments this year, including cold weather and aboard ships. Production is likely to commence following the completion of this work.

Flightglobal's Ascend Fleets database records South Korea as having ordered 22 Marine Surions, with letters of intent in place for another 18. ■

DEVELOPMENT BETH STEVENSON LONDON

DARPA leads charge for UAVs that can join forces

The US Defense Advanced Research Projects Agency has invited industry to get involved in the first phase of an effort to develop "collaborative autonomy" capabilities for unmanned air vehicles.

Under its Collaborative Operations in Denied Environment (CODE) programme, DARPA identifies the merits of unmanned air systems, but believes their capabilities are limited in long-distance operations and contested environments because of their reliance on constant, dedicated control.

"These requirements severely limit the scalability and cost-effectiveness of UAS operations and pose operational challenges in dynamic, long-distance engagements with highly mobile targets in contested electromagnetic environments," it says. "Collaborative autonomy has the

potential to significantly increase the capabilities of legacy assets, as well as to reduce the cost of future systems."

Using so-called "collaboration algorithms", UAVs would be able to pass on the location of targets to each other, as well as offering different fields of view for target identification and navigational information over a network.

Responses are due by 4 February, with two meetings planned for the first week of March. These will respectively review the requirements for making CODE open architecture-compatible with communication-constrained, distributed, highly autonomous collaborative systems, and ask participants to present technologies for potential incorporation into demonstrations planned during the programme's second and third phases. ■



CHARTER KATE SARSFIELD LONDON

Lift Air hails its Cirrus air taxis

US start-up Lift Air has launched an air taxi operation from its Florida base with Cirrus SR20 and SR22 piston singles.

"There is a lot of demand for low-cost, flexible, point-to-point air services," says Lift Air director of operations Nathan Barrett.

The Sarasota-based company plans to service the Florida region and says its opportunities to expand are currently restricted. "Our aircraft operator's certificate is limited to single pilot operations," says Barrett. "It is costly to expand an AOC, but we will consider a multi-pilot, multi-aircraft AOC as business increases."

Lift Air joins a growing number of air taxi companies in the USA using the four-seat, piston-engined Cirrus range. "The SR20 can carry three passengers and costs \$1,450 for a return flight from Tampa to Miami," Barrett says.

"This is equivalent to a first class fare on an airline, but slashes travel time significantly." ■

PISTON TWINS KATE SARSFIELD LONDON

Diamond set for certification of DA62

Diamond Aircraft is hoping to secure European certification for its top-of-the-range DA62 in April – two years after the launch of the seven-seat piston-twin.

The approval should coincide with Europe's leading business and general aviation show, Aero Friedrichshafen, where the Austrian airframer is planning the handover of the first of the all-composite types to its as-yet unnamed launch customer.

"We will also begin taking orders for the DA62 at Aero," says Diamond Aircraft chief executive Christian Dries. "We have received a lot of interest in the aircraft, but we don't want to take anyone's money until we are sure what we can deliver and when."

"The DA62 test aircraft is flying daily in Wiener Neustadt. We are very pleased with its performance," Dries adds. However, Diamond will only reveal its specifications upon certification.

The DA62 is the largest aircraft in the Diamond family and is



The test aircraft is flying daily from Wiener Neustadt

pitched against high-performance piston types such as the Beechcraft Baron and Cessna 400.

Targeted at private owners, corporate operators and air taxi companies, the DA62 is powered by two 170hp AE300 Jet A1/diesel fuelled engines, developed by Diamond's sister company, Austro Engines.

The aircraft is available in two versions. The first has five seats and a maximum take-off weight of just under 2,000kg (4,400lb). "This is ideal for the European

market," says Dries, "where aircraft over this weight [benchmark] are subjected to Eurocontrol [air traffic control user] fees."

The other version has seven seats and a maximum take-off weight of 2,300kg. "Unfortunately we cannot put in seven seats and the fuel and keep below the 2,000kg limit," he adds.

Dries says the USA is likely to be the largest market for the DA62, and Diamond is working with the FAA to secure validation "as soon as possible". ■

REGULATIONS DAVID LEARMOUNT LONDON

Business blow for London RAF base

Judge rules Northolt must adhere to civil rather than military safety standards after rival airports challenge its status

The status of RAF Northolt as one of London's principal business aviation airports is in doubt following a legal ruling on which agency is responsible for the safety of civil traffic there.

Several airports serving the London business aviation community have called for judicial clarification as to whether RAF Northolt, which encourages business flights to use it commercially, adheres to the aerodrome safety rules civil airports have to follow.

The request for judicial review was rejected on a technicality, but the judge ruled that the UK Civil Aviation Authority, and not the Military Aviation Authority (MAA), is responsible for ensuring the safety of its civil aircraft, reversing current assumptions.

The action was initiated soon after the Ministry of Defence was granted permission to extend the cap on annual business aviation movements at Northolt – which is closer to central London than any of the plaintiffs' aerodromes – from 7,000 to 12,000.

The airports that filed for a judicial review of Northolt's safety are Biggin Hill and London Oxford. The court dismissed the judicial review, but required the CAA to pay its own costs and issued a judgement on the law: "It is the Secretary of State for Transport/CAA, rather than the Secretary of State for Defence/Ministry of Defence, which has statutory responsibility for safety in relation to the use of RAF Northolt by civil aircraft."

It adds: "The MAA does not have statutory responsibility for the safety of all aircraft using RAF Northolt. Its safety responsibilities are confined to the safety of military aircraft using RAF Northolt."

The reason for the review's rejection is that "we knocked at the right building but the wrong door", says Biggin Hill's managing director Will Curtis.

The judge says he was asked to rule on whether the government's arrangements for overseeing and regulating the use of Northolt airport by civil aircraft are lawful, particularly in respect of safety – not on whether RAF Northolt meets appropriate safety standards for such aircraft.

However, according to counsel for Biggin and Oxford, in some

respects Northolt does not meet those civil standards, and the judgement says that since Northolt accepts civil traffic, this is the CAA's responsibility and not the MAA's, as the CAA continues to claim.

Curtis offers two examples involving Northolt aerodrome where the site does not comply with Civil Air Publication 168 and ICAO Annex 14. The runway end safety areas, he says, do not meet safety regulations, and the main runway 25 has a petrol station under its short final approach. The RAF officers' mess – a listed building – also encroaches into the approach path.

Curtis says he has written formally to the CAA and is awaiting a reply. ■



Shifting south
FEATURE P26

ANALYSIS DAVID LEARMOUNT LONDON

CAA lauds improved offshore safety

Interim report details “substantial progress” in oil and gas helicopter operations and calls for continued co-operation

North Sea oil and gas support helicopter operators are making “substantial and important progress” towards improving safety, according to the UK Civil Aviation Authority.

The regulator has published an interim report assessing progress against its plan, launched in February 2014, to improve sector safety. The review was prompted by “five significant accidents between 2009 and 2013”, two of which were fatal.

In the report, the CAA highlights the principal areas receiving attention: improving passengers’ chance of escape and rescue in the event of ditching, reducing risks around helidecks, raising pilot training standards – especially for flight in instrument meteorological conditions, improving understanding of technical failures – especially in critical parts, and making technical failure alerts more reliable and effective.

Mark Swan, CAA director for airspace and safety regulation says: “Ten months on from the publication of our review, substantial and important progress has been made toward improvements in offshore helicopter safety.

“Today, flights no longer take place over the most extreme sea conditions. Every single passenger on an offshore helicopter is equipped with a new [and] improved emergency breathing system. Offshore workers have received new guidance and – crucially – improved safety training.”

CATALYST

Safety culture has also altered, says Swan, pointing to a “strong collective commitment to change” from across the industry. The newly formed Offshore Helicopter Safety Action Group “is proving a catalyst for increased dialogue between helicopter operators, employee representatives, manufacturers and regulators,” he writes.

One of the key findings of the CAA’s review was that while heli-



Rig helidecks will require certification for the first time this year

copter operators all had their own safety management systems (SMS), there were differences in what these addressed. However, the CAA notes that operators had

“It is strongly intended that the momentum built over this year should continue”

UK CIVIL AVIATION AUTHORITY

already recognised this issue before the publication of the review, and launched their own initiative – the Joint Operators’ Review – which aims to share safety data and identify and agree on best practices. This in turn led to the establishment of Heli Offshore on 21 October 2014 – a safety organisation involving five of the world’s largest helicopter operators, including the North Sea’s ‘big three’.

The new report also summarises the outcomes from a SMS symposium in Aberdeen last July, attended by the main UK offshore helicopter operators, the Helideck Certification Agency, the Belgian civil aviation authority and Danish transport authority Trafikstyrelsen. From this event emerged a “top 10” list of issues, including night operations to helidecks, operations to and from ship bow decks, a training and experience review,

the influence of commercial pressures from the oil and gas industry, flightdeck automation, operation to unmanned decks, fatigue relating to flightcrew, engineering, ground operations staff and management, helideck standards – including obstacles, fuel storage and deck management, aircraft design and manufacturer support.

Until now, helidecks have not required certification if they are offshore. The CAA says that will change this year, as will requirements for firefighting arrangements, especially at normally unmanned decks.

EVIDENCE

Also, the CAA says crew operational decision-making and aircraft system design affect each other when false warnings occur. The authority says that although this does not happen often, a decision to ditch following an alert that turns out to be false is serious while in flight over the freezing waters of the North Sea. The CAA notes that anecdotal evidence on the frequency of false warnings is sufficient to cause crews to be sceptical of them, which creates a risk in its own right.

“We have reviewed the issue of crew response to engine fire warnings, and confirmed that helicopter operators and crews are aware of the false alerts,” the authority says.

“Helicopter operators have now changed procedures to en-

sure crews take a measured response to any warning – checking for confirmatory signs rather than immediately shutting down an engine.”

The CAA observes that some new models are also equipped with tail-mounted video cameras, which can aid confirmation of an in-flight fire or other issues. Consideration should be given to retrofitting similar devices to older aircraft, it adds.

Meanwhile, the CAA and manufacturers are working with EASA to develop new definitions on which helicopter parts are designated “critical”, with a view to enabling improvements in their manufacture, verification and monitoring.

In addition, the CAA has conducted a number of audits to see whether operators have been consistent in applying data generated by vibration health monitoring (VHM) systems. “Results have been shared with helicopter operators, and identified improvements will now be progressed for each aircraft type and VHM system,” it says.

Above all, the authority wants to see the recent impetus for change sustained: “It is strongly intended that the momentum built over this year should continue,” it says, identifying the “working relationships” established between operators, regulators and manufacturers as key to introducing further safety improvements “and the embedding of a stronger safety culture across the offshore helicopter industry”.

Swan adds: “The safety of those who rely on offshore helicopter flights is our absolute priority: we all know exactly what is at stake.

“I hope that in our next progress report, we will be able to show that the short-term actions completed to date are being followed by the further steps needed to secure long-term change.” ■



For more in-depth coverage of the global rotorcraft sector: flightglobal.com/helicopters

SHIFTING SOUTH

In 10 years the US southeast has gone from obscurity in aerospace terms to an emerging powerhouse of the industry, thanks to investments by Airbus and Boeing

STEPHEN TRIMBLE WASHINGTON DC

What a difference a decade makes in the geography of the US aerospace industry. It was only 2004 when the US southeast region was known in aerospace circles primarily as a base for NASA in Florida and Alabama and a manufacturing hub for Gulfstream business jets and Lockheed Martin fighters and airlifters in Georgia.

Assembling commercial airliners in the southeast – a multistate area shaped by the Mississippi River in the west, Atlantic Ocean to the east, the Ohio River in the north and the Gulf of Mexico to the south – was not only non-existent. It was not even seriously contemplated by anyone anywhere in the industry.

Boeing vice-president and general manager Jack Jones now oversees a sprawling factory complex in North Charleston, South Carolina, with 7,500 employees on the payroll and still hundreds of acres of empty land under the company's control. As late as the end of 2003, however, such a scenario would have seemed

inconceivable to a veteran of Boeing's commercial base in the Pacific Northwest.

"Twelve years ago it wasn't even a gleam in some Boeing leader's eye," says Jack Jones, who retires in April. "There was no need to consider building outside Puget Sound."

In 2004, Boeing's vision for the region changed irrevocably, but not in the way it originally intended. That was the year two key Boeing suppliers for the 787 programme – Global Aeronautica, a joint venture of Alenia Aeronautica and Vought, and Vought by itself – announced plans to assemble the aft and centre fuselage sections in North Charleston.

TRAUMATIC EVENTS

The announcement established Boeing's first connection to South Carolina, but only tangentially. It would take another five years and a series of traumatic events, including an industrial breakdown by Global Aeronautica and a union strike in Puget Sound to finally push Boeing to build aircraft in South Carolina.

The same unlikely series of events drew Airbus to the region. In 2005, the European



Airbus Group chief executive Tom Enders (third left) joins Airbus and community representatives breaking ground at Mobile

Airbus and Boeing are actually among the last manufacturers to recognise the appeal of the southeast

manufacturer teamed with Northrop Grumman to build a military tanker version of the A330 in Mobile, Alabama. Airbus also expected to build the commercial freighter version of the A330 in the same complex. Although the Airbus bid for the US Air Force tanker contract was ultimately defeated in 2011, the company decided a year later that Mobile would make a good location to build A320s. The final assembly line is scheduled to begin operations in July, deliver the first aircraft in April 2016 and ramp up to four deliveries per month by 2018.

"I think we'll beat 2018 on the four-month target," says Allan McArtor, chairman and chief executive of Airbus Group Inc, the US-based subsidiary.

Boeing began delivering 787s from North Charleston in May 2012. As Airbus ramps up to building four A320neo family aircraft per month in Mobile by 2018, Boeing plans to ramp up 787 production to seven per month before 2020. Within less than a decade, the US southeast will become a major commercial aircraft manufacturing hub, rivalling only Puget Sound and Airbus's assembly hubs in France and Germany.

Airbus and Boeing are only the latest aerospace manufacturers to recognise the appeal of the US southeast. In the past decade, Airbus Group has opened a design centre in Alabama and a military and civil helicopter factory in Mississippi; Spirit AeroSystems has



The Boeing facility in Charleston began deliveries in 2012 and has 7,500 employees



inaugurated a factory supporting A350 production in North Carolina; Embraer has started assembling Phenom business jets and will soon begin assembling Legacy 450/500 jets in Florida and Honda Aircraft has erected a factory in North Carolina to begin ramping up production after the HondaJet obtains an airworthiness certificate.

Meanwhile, existing aerospace manufacturers in the southeast have bolstered their presence in the past two years. Lockheed offset the closure of the F-22 assembly line in Marietta, Georgia, by shifting assembly of the F-35 centre wing box assembly from Fort Worth, Texas. Gulfstream announced in October that it will expand in Savannah by launching production of the G500/600 jet family, which includes insourcing wing assembly work previously performed by Spirit AeroSystems in Oklahoma.

TALENT

The growth in the US southeast is not limited to assembly and manufacturing work. The region is also attracting engineering talent. Northrop Grumman, for example, selected Melbourne, Florida, in 2014 for Project Magellan, a highly sought-after aerospace design centre. A year earlier, Boeing decided to expand in Huntsville, Alabama, choosing its missile defence business hub for Project Bright Minds, an engineering and design centre for Boeing Research and Technology.

If an aerospace company has opened a new site anywhere in the USA over the next five years, it has almost exclusively been somewhere in the US southeast.

The appeal of the region is often linked to the absence of organised labour. With the exception of Lockheed's factory in Marietta, the aerospace industry's expansion in the region

has so far evaded the efforts of union organisers. But labour's absence does not fully account for the region's appeal.

Ringed by coastlines, the southeast boasts multiple deepwater ports and close access to overwater airspace that is ideal for flight tests of new aircraft prior to delivery. A large supply of active and shuttered military bases, meanwhile, offer a ready supply of trained mechanics and long runways.

"Logistically, [Mobile] is ideal for us," McArtor says. "A deepwater port is right next door to the airport. It's got a good runway and Gulf airspace for flight test."

On top of the logistical advantages, the US southeast is perhaps unusually welcoming to hosting big manufacturers, especially if they make aircraft.

Southern states have offered generous subsidies to aerospace companies. Alabama promised to give \$158 million to Airbus, including building a \$52 million centre for on-site worker training, for hosting the A320neo final as-

sembly building in Mobile. North Carolina offered \$250 million in subsidies, including workforce training worth \$136 million, to Spirit AeroSystems to open the major component assembly factory for the A350 in Kinston.

TAX BREAKS

South Carolina topped all the other states by giving \$900 million in tax breaks, plus \$33 million for free worker training.

The US southeast, of course, is not unique in this respect. Washington state officials extended to Boeing tax breaks and new subsidies over the next decades worth \$7.8 billion in return for keeping 777X assembly and establishing the widebody programme's composite wing fabrication facility exclusively in Puget Sound.

While such largesse has not become available in the American south, state and local officials can offer other benefits to highly prized manufacturers.

In 2011, Boeing opened the 787 final assembly and delivery facility on the North Charleston site. The assembly building occupies 102,000m² (1.2 million ft²) of usable space. The volume below the roof is enough to hold water in 450 Olympic-sized swimming pools.

In 2004, Boeing's vision for the region changed irrevocably, but not in the way it originally intended

"You think about this huge building and how bureaucratic permitting can be," Jones says. "In other states you have to go through a lot of bureaucracy. I'm not saying we didn't, but here's what the state was committing to do: we don't have to wait until first shift, which is in a lot of states the only time when employees are available to come and do inspections. They



A 787 coming off the line at the Boeing plant

» were available 24h every day of the week. We were never held up for permitting.”

With certain advantages come some key differences. Boeing has an established workplace culture in the famously caffeinated Pacific Northwest. The American south has a culture that is distinctly slower and more relaxed.

“We made sure we adapted to the south,” Jones says. “Sundays are for church and family and we respected that. We didn’t tell people they had to come in on Sundays. There were some Sundays they obviously had to, but we’re very conscious of those kinds of things.”

In return, a new workforce in South Carolina must adapt to the unforgiving culture of aerospace manufacturing. Global Aeronautica failed to adapt quickly enough. Boeing acquired the share of the 787 supply chain claimed by the former Vought in 2008. It then bought out Alenia Aeronautica’s share of the joint venture in 2009. Boeing hired hundreds of contractors to stabilise the production system, then launch assembly of the 787-8 in 2011.

BREAKDOWN

Despite nearly a decade of experience at the North Charleston site, the system appeared to hit snags again in early 2014. Boeing’s top executives acknowledged a production breakdown at the midbody join position in North Charleston during the first quarter of last year.

The midbody join, roughly the size of an entire 737 fuselage, represents one of the most challenging work packages in the 787 assembly process. Workers must assemble fuselage sections fabricated in Japan, Italy and South Carolina. Complicating their efforts early last year was the introduction of the 787-9. The stretched variant integrated several design changes compared with the 787-8, and most were concentrated at the midbody join position in North Charleston.

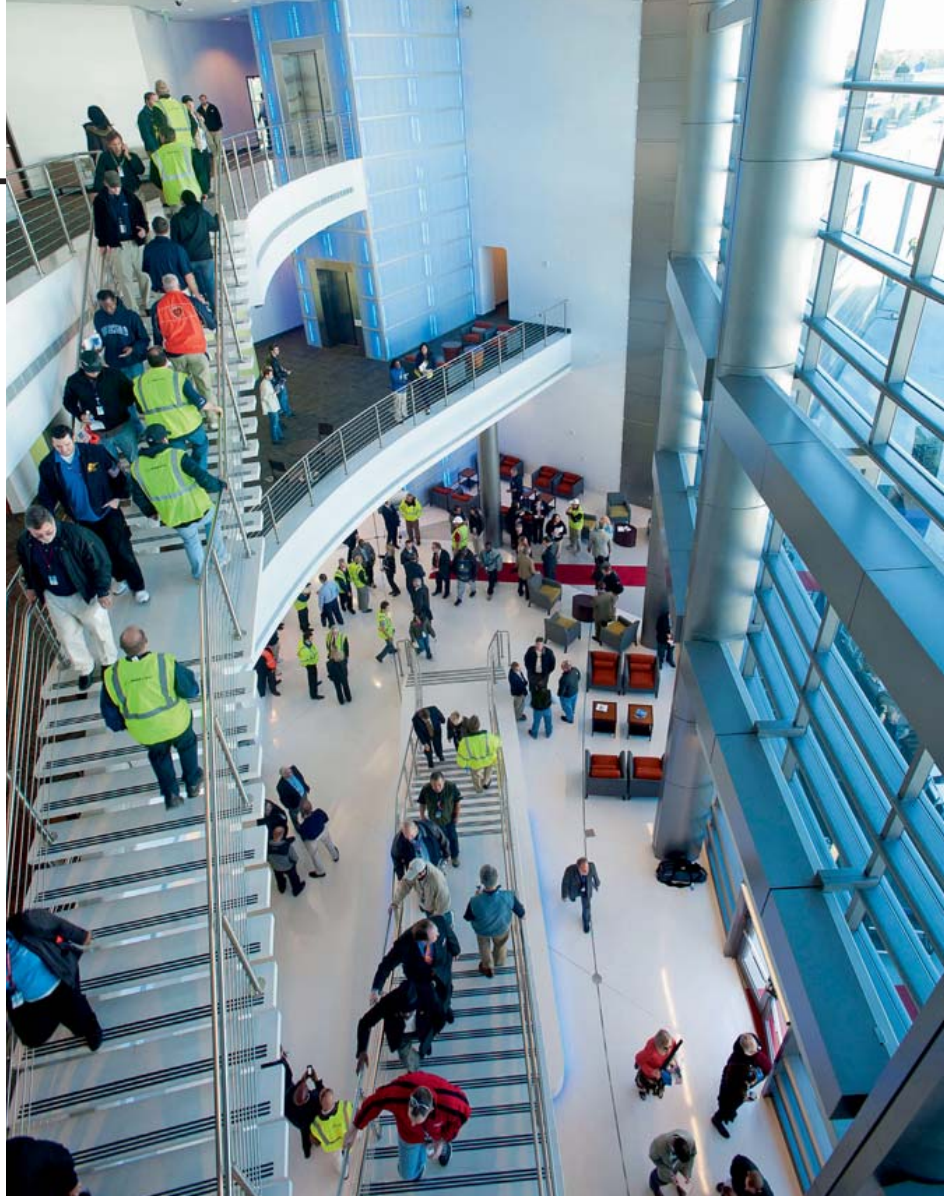
At the depth of the production crisis, Wall Street analysts expressed concerns about the bottleneck. Boeing had promised to deliver at least 110 787s in 2014, and the disruptions in Charleston could prevent the company from meeting that goal.

A year later, the record is clear: Boeing delivered 114 787s in 2014, beating the low end of the company’s target. Along the way, programme officials dealt with greater challenges than in North Charleston. A manufacturing flaw in Japan last March forced Boeing to inspect the wings of 43 787s still on the assembly line for cracks. A shortage of premium cabin seats by the end of the year also threat-

“The industrial capability of a final assembly line is basically a commerce magnet”

ALLAN MCARTOR

Chief executive, Airbus Group Inc



Boeing up in the world: the opening ceremony at North Charleston

ened to stall deliveries. The supplier issue in North Charleston, however, was quietly resolved months ago, Jones says. “I can tell you right now this site has never been in a better... condition than any other time we’ve been here,” he adds.

The recovery forced Boeing to hire more workers less than a year after laying off hundreds of contractors in North Charleston. Boeing also established a productivity payout award to incentivise the South Carolina workforce. “Our deliveries are now on time,” Jones says. “It’s just short of a – I won’t say a miracle, because this is a great team – but the recovery has been swift.”

A key reason for the recovery in North Charleston, according to Jones, is a function of Boeing’s non-unionised shop floor.

A machine is used to drill holes for fasteners in the crown of the 787 fuselage. Boeing engineers programme the software for the machine, but machinists monitor the automated system on the assembly line.

In Seattle, union contract rules mean that the engineers must rely on the machinists to explain any problems with the coding. In North Charleston, however, the engineers are able to operate the machine themselves.

“We actually took the engineers, trained them for about three months, put them on these machines inside the airplane working alongside the mechanic,” Jones says. “They learned an incredible amount. Quite frankly, that was one of the reasons why we recovered so quickly.”

EXPANSION

Boeing’s expansion in North Charleston has drawn a strong response from the International Association of Machinists and Aerospace Workers (IAM). The IAM estimates that only 3.7% of the overall eligible workforce in South Carolina is organised, so establishing a union at the Boeing factory is a key prize. The IAM set up an office in North Charleston in March 2014 to begin organising. If 30% of Boeing’s eligible workforce sign pro-organising cards, the IAM can petition the National Labor Relations Board to call an election.

If the IAM campaign has fallen on deaf ears, it does not seem so to Boeing and state government officials. Both have launched public campaigns against the IAM’s efforts. South Carolina’s strongly anti-union governor, Nikki Haley, has publicly called on Boeing’s workers to reject the IAM’s “meddling”

in South Carolina. For Jones, keeping the IAM out of North Charleston is a top priority for Boeing management. "We're 100% focused in the near term to make sure we don't have [a union]," he says, "which we don't feel we need. It's in the best interest of our site here not to have them."

If the IAM is successful, Jones would not say whether Boeing would reconsider its current industrial footprint in North Charleston or keep additional work from moving to the site in the future. "We are just really truly focused on making sure that people understand what the pitfalls are to bringing in a represented workforce," Jones says.

ORGANISED

Whether or not the site is organised, however, Boeing is expected to grow its operations significantly in South Carolina.

The 787 final assembly line is scheduled to grow from delivering three aircraft per month today to five in 2016 and seven in 2018. By then, the North Charleston site will be the exclusive final assembly location for the 787-10, the only variant of the composite-skinned widebody that will not be delivered from Everett, Washington.

Meanwhile, the South Carolina site has begun construction of two new paint hangars. When those paint booths are complete, they will give the North Charleston site the capacity to deliver up to eight 787s per month.

Since late-2013, speculation has also swirled about a 466 acre (189ha) tract of land acquired by Boeing that lies adjacent to its current operations. A re-zoning request filed by Boeing with the local government in June 2014 seeks to grant the company the flexibility to develop the land as an "aircraft manufacturer" in the future. Despite the intense interest in the property, Boeing officials say the plan at the moment is to build a parking lot.

"I get more questions on that one [land] acquisition," Jones says. "You can imagine



Airbus believes expanding the Mobile plant in the future would be straightforward

when you take on that much additional land there's these conspiracy theories about bringing programmes and all that. I will absolutely tell you there is no plan right now beyond the parking lot. What Boeing typically does on a site like this is protect [itself] for the future for anything [it] wants."

In Mobile, Airbus faces many of the same questions about expansion plans. As the A320 production system ramps up to building four aircraft per month, there is already pressure to double output at the site to eight per month. "We'd have to do a little more construction, but it's really pretty minor," says McArtor. In the long term, McArtor has also not given up on the original vision for Airbus in Mobile, which was focused on building A330s for military and commercial customers.

"It's something I push personally, but we don't have any current plans to do that," McArtor says. "But I keep reminding everybody that we have a great deal of capability in the US."

By the end of this decade, the US southeast could be producing as many as eight Airbus narrowbodies and seven Boeing widebodies per

"We made sure we adapted to the south. Sundays are for church and family"

JACK JONES

Vice-president and general manager, Boeing

month, plus dozens of business jets designed by Embraer, Gulfstream and Honda. That concentration of aerospace manufacturing has already drawn interest from suppliers. Notably, Toray, a supplier of composite material for the 787, has opened a new factory in Spartanburg, South Carolina. More aerospace subcontractors are likely to establish hubs in the region.

"The industrial capability or industry facility of a final assembly line is basically a commerce magnet. Suppliers can create a halo effect around these sites," McArtor says.

Airbus's European subcontractors have been asking McArtor for information about locating in the southeast. "They say: 'What do we want to do?'" McArtor says. "Do we want to make [capital investments] in euros and staff it with European labour, or do we want to go to the US for the same reason Airbus is there?"

For Boeing, the company's policy has no requirement for suppliers to set up shop near final assembly hubs.

"Now, if they decide to elect on their own to do that, we think that's great," Jones says. "And it really does put them closer to us."

Although suppliers have been slow to follow the OEMs into the region, the logistics of serving multiple final assembly lines in the same area may create its own logic.

"There was a lot of people waiting to see if we can even do this," Jones says. "Now, with the success we've had, we're sure there are more companies that will look to Boeing, and say: 'If they can do it and they are remaining in the region, then maybe we should take a harder look.'" ■



Some of Airbus's European suppliers could follow the airframer to the southeast



Rex Features

FLIGHTS OF FANCY

A bio-electric, six-seat aircraft – the brainchild of an inventor who designed a tablet computer before Apple – Boeing's latest endeavours with green diesel, plans to develop jet fuel derived from industrial waste gases and a NASA project to finesse the hybrid wing body concept. These are the topics covered in our latest special report on aviation and the environment

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Boeing's ecoDemonstrator (top)
and NASA's hybrid wing body



Further into the future, Faradair envisions scaling up the design to create a 20-seat regional jet

GENERAL AVIATION

The dream machine

A UK start-up is seeking investors to help transform a unique bio-electric hybrid aircraft from concept vehicle into a reality

KERRY REALS LONDON

Asix-seater, fixed-wing aircraft that operates silently, takes off and lands in confined urban areas, ticks all the green boxes through a combination of hybrid engines, solar panels and wind turbines, and has unmanned capabilities in case of a pilot emergency.

Does this sound too good to be true? UK-based start-up Faradair doesn't think so. This small, Cotswolds-based company is in the process of gathering like-minded investors to help turn its dream of building a prototype from its bio-electric hybrid aircraft (BEHA) concept into reality as early as next year.

BEHA is an all-composite, triple-box-wing, hybrid multi-engine concept aircraft that Faradair managing director Neil Cloughley believes has the potential to offer "something unique" to the general aviation market. Further into the future, he envisions scaling up the design to create a 20-seat regional jet.

"I think there's a market for intercity hopping for a 20-seat aircraft that could open an exciting opportunity," says Cloughley.

In the GA sphere, he sees the aircraft fulfilling a range of uses, from flying taxi to police helicopter replacement to coastal patrol to anti-poaching device. The aircraft's near-si-

lent design means it "could be phenomenal" at creeping up on poachers and, while "this is not going to be a huge market", Cloughley says he has already had discussions with "a well-known wildlife protection group" which he hopes will lead to some form of alliance announcement shortly.

BEHA takes its inspiration from the de Havilland Dragon Rapide, a 1930s biplane, but instead features a triple-box-wing design with solar 'skins' covering all flight surfaces. Unlike the Solar Impulse prototypes, BEHA's solar panels will not be used to charge the electric motors – their purpose solely being to provide "additional trickle charge and to power the avionics", says Cloughley.

The rear-mounted wind turbine will be used for a similar purpose, although Cloughley declines to elaborate on its design, only saying: "Every man and his dog will tell you why [the wind turbine] can't work because it creates too much drag. I can't go into detail but we have a specific idea of how we're going to use them."

The aircraft's design also features two electric and one biodiesel engine providing 600hp (450kW) of combined power. The biodiesel

engine can remain idle on take-off and landing, enabling the aircraft to operate "24/7" because it would not be affected by noise restrictions, says Cloughley.

At 200hp each, BEHA's electric engines will be "considerably more powerful" than the Airbus E-Fan prototype, although they follow "the same sort of design". The first BEHA prototype will have fixed landing gear, but Cloughley says that "later variants would look at a different configuration".

VERSATILE

A key feature of the Faradair concept aircraft is that it will be able to perform short take-offs and landings, meaning it could potentially be used in congested urban areas. "We have no fixed figure for short take-offs and landings but we're hoping it will be the shortest for a fixed-wing aircraft in the world," says Cloughley. "The fact that it can get in and out of confined areas opens up interesting market opportunities."

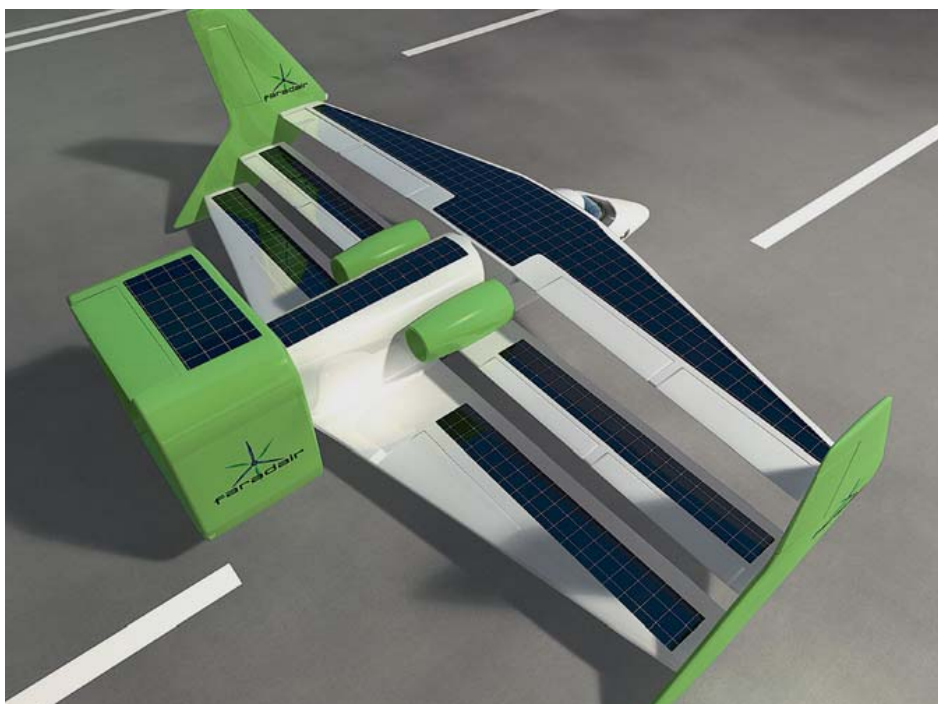
Range has yet to be decided, although Cloughley says "we're ideally looking at 1,000nm [1,850km]". With an anticipated cruising speed of 130-170kt (240-320km/h), BEHA is "not going to break any speed records", he says, adding: "In time, we hope to build a pressurised aircraft."

Faradair has teamed up with Cranfield University, which is about to start computational fluid dynamic (CFD) analysis on the design that will lead to its own "tweaked and refined" version in six to eight months.

In addition to its environmental credentials, Cloughley is hoping that BEHA will become "one of the safest" aircraft to operate. To this end, a number of safety precautions have been built into the design. For instance, in the event of the aircraft losing power during



Triple-box-wings incorporate solar panels



Faradair aims to complete its first prototype by 2016 and begin production in 2020

» flight, Faradair says it will have “excellent glide capability”, as well as a “ballistic parachute recovery system”.

The carbon fibre fuselage, which Cloughley says will be made by “a very well-known motorsport manufacturer”, will include a “Formula 1-style crash tub” designed to minimise damage to the body of the aircraft in the event of a collision.

In addition to all of this, the prototype will have full unmanned capability. “If a pilot was flying a family from Paris to London and the pilot had a heart attack, he would be able to hit a panic button to alert an air traffic controller on the ground, who would then be able to control and land the aircraft,” says Cloughley.

The team behind the Faradair project “fully appreciate[s] the mountain to climb” to get it off the ground, chiefly the huge amounts of funding that need to be sourced.

“We think we can get an EC grant because we fulfil so many of their criteria”

NEIL CLOUGHEY

Managing director, Faradair

The fledgling company launched a crowdfunding initiative via the Internet late last year, but this failed to help it achieve its initial £20,000 (\$30,200) target – itself a long way off from the £3-5 million needed to build the prototype.

The upside of this, says Cloughley, was that the company got its message into the public domain and learned some valuable lessons about fundraising. “We now have investors who are keen to get involved and a new direct investment scheme,” he notes.

Faradair is also optimistic about the possibility of being awarded a grant by the Europe-

an Commission under the EU Clean Skies programme. “This is a real target for us,” says Cloughley. “We think we can get an EC grant because we fulfil so many of their criteria.”

HURDLES

High barriers to entry and extremely stringent safety certification procedures also stand between dream and reality, and Cloughley is hoping the involvement of Cranfield and other experienced parties will help it overcome these hurdles. “We’re working with Cranfield and they’ve been through these certification processes. We will most likely bring in other partners as well who have been through that process.”

The company aims to begin building its first prototype in 2016 which, after two to three years of testing, could result in it having “a production aircraft ready by 2020”.

Cloughley, whose background is in aviation asset trading and IT, has a very personal interest in seeing BEHA take off. Back in 1990, his father designed a UAV with a rhomboid wing configuration which Cloughley describes as being “way ahead of its time”. The UAV “never came to market” after backers “pulled the plug” on the business, and its assets were sold to a US company which “created the aircraft and won an \$80 million contract”.

Furthermore, Cloughley himself encountered a similar scenario a decade later. In 2000 he formed a company called TechDawn, which he says partnered with Siemens and Sun Microsystems to develop a new tablet computer to enable mobile Internet access. Sun Microsystems decided not to pursue the project and TechDawn could not raise sufficient funds from venture capitalists to continue with it. Three years later, the Apple iPad was born and the rest is history.

Cloughley says he has learned a great deal from these events and is very much hoping it will be third time lucky for his BEHA venture. ■

COMMERCIAL AVIATION

Green fuel, green light

A successful trial has prompted Boeing to sound a note of confidence in the potential benefits of its blended diesel

KERRY REALS LONDON

Fresh from carrying out the first flight to be powered by a blend containing yet-to-be certificated green diesel, Boeing has high hopes for this type of fuel, and is optimistic it will be approved for commercial use later this year.

The airframer in December used its ecoDemonstrator 787 test aircraft to operate 10 flights fuelled by a blend comprising 15% green diesel and 85% Jet-A. The first flight used the blend in just the left engine, but the subsequent nine flights used it in all tanks of both engines.

“This is very important and speaks to the confidence that Boeing has in green diesel’s

The ecoDemonstrator used the blend in 10 test flights in December



potential as jet fuel. It is very rare to use an unapproved fuel in all engines for test flights,” says Boeing Commercial Airplanes managing director of environmental strategy and integration Julie Felgar.

COST BENEFITS

Following the test flights, Boeing’s chief pilot for product development, Mike Carriker, said the aircraft “performed as designed with the green diesel blend, just as it does with conventional jet fuel. This is exactly what we want to see in test flights with a new type of fuel”.

Green diesel is derived from vegetable oils, waste cooking oil and animal fats, and shares many of the same properties as hydro-processed esters and fatty acids (HEFA) fuels, which have already been approved for use in commercial aviation. One key difference is that the method of making green diesel is shorter than the HEFA process, as the last stage of the HEFA process can be skipped.

“Because [green diesel] doesn’t require the final stage of HEFA, costs are lower and yields are higher,” Boeing’s director of environmental policy and strategy for Europe, Richard Mills, told delegates attending the Royal Aeronautical



Boeing is aiming to gain approval for the alternative fuel from ASTM International this year

“We need to think about creating a level playing field for aviation’s use of this fuel”

RICHARD MILLS

Director, environmental policy for Europe, Boeing

Society’s Greener by Design and Propulsion conference in October. “If one looks at global production, green diesel exceeds 1% of [global] aviation’s needs, so it can immediately provide

a very significant source of alternative fuel.” Boeing is targeting approval of green diesel by certifying body ASTM International in 2015. “Discussions about green diesel approval are about amending the HEFA specification to enable the use of green diesel, rather than designating green diesel as a new type of fuel, as we saw with farnesane,” she adds.

At this stage, Boeing has no plans to conduct further green diesel flights using a higher blend ratio, although “that could change if there’s a reason to do it”, says Felgar. The green diesel used in December’s flights was produced in Europe by Finland-based Neste Oil, and “there is obviously a cost in dollars and time to transport it to Seattle for test flights”. The fuel was blended by Epic Aviation.

POTENTIAL

“We’re told that current global production capacity is more than 800 million gallons and is expected to grow,” says Felgar. “Approval for green diesel’s use in commercial aviation would add a market for green diesel producers and another potential reason to expand.”

In the USA, a government incentive scheme means that green diesel can be “sold at fossil parity”, so “potentially you have a very interesting proposition”, says Mills. “In Europe, those incentives are not in place – we need to think about creating a level playing field for aviation’s use of this fuel.”

For green diesel and other sustainable aviation fuels to progress, petroleum companies are “critical”, according to Jennifer Holmgren, chief executive of alternative energy producer LanzaTech. “There is a tremendous amount of infrastructure in place, it would be a shame to have to rebuild it,” she says.

Speaking on behalf of such companies, John Cooper, director of European biofuels strategy at BP Refining & Marketing, says it “takes a sustained effort and commitment to be in the business of blending fuels and meeting regulations”. He encourages the aviation industry to seek help from the road transport sector and develop the fledgling biofuels market, noting that road transport “should be seen as partnership, not competition”. ■



RESEARCH

Turning up the gas

A scheme to turn waste from steel mills to jet fuel is starting to fly, but more investment is needed for biofuels to really take off

KERRY REALS LONDON

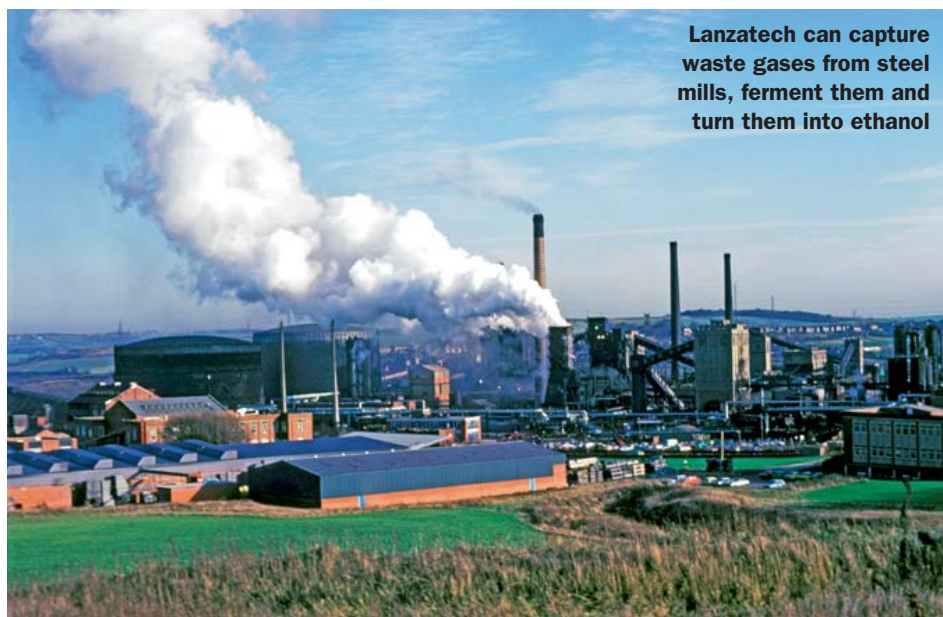
Lack of investment has long been a stumbling block in the quest to transform a range of promising alternative aviation fuel pathways into a full-scale industry capable of producing significant volumes. But there are signs that financial backers are starting to get on board.

In October, Virgin Atlantic Airways announced that UK-based bank HSBC had joined its partnership with New Zealand-based carbon recycler LanzaTech to develop jet fuel from waste gases emitted by steel mills. LanzaTech captures these gases, ferments them and turns them into ethanol, which is later converted into synthetic jet fuel.

At the time, HSBC global head of sustainability Simon Martin said: "We want to support really innovative projects that accelerate the shift to a low-carbon economy. This partnership reflects our commitment to work with suppliers and customers alike to help address climate change, creating an environment in which businesses can be sustainable in the long term."

INVESTMENT

Virgin Atlantic says that HSBC's investment will ensure that a demonstration flight using the new alternative fuel "will take place within the next year". The airline had originally hoped to begin using the fuel sooner, but



LanzaTech can capture waste gases from steel mills, ferment them and turn them into ethanol

the alcohol-to-jet (ATJ) pathway has yet to be approved by certificating body ASTM International.

LanzaTech chief executive Jennifer Holmgren says she is confident that ATJ certification will be achieved this year, meaning "we could start using it in 2016". Holmgren says certification was delayed because an argument developed over "ethanol versus butanol", but she adds that "the alcohol guys are now working together" to assemble sufficient data for analysis by ASTM.

There is "no single silver bullet" when it comes to biofuels for aviation, Boeing's director of strategy for the UK and Ireland, Richard Mills, told delegates attending the Royal Aeronautical Society's Greener by Design and Propulsion Conference in October. Instead, a "portfolio of successful pathways" will make up a global patchwork of alternative fuel options for airlines.

Three pathways for producing alternative aviation fuels have so far been approved by

ASTM. These include synthetic paraffinic kerosene (SPK), hydro-processed esters and fatty acids (HEFA) fuels and synthesised isoparaffinic (SIP) fuels. Several other pathways are in the pipeline, including ATJ and green diesel, both of which are tipped for certification this year.

INCENTIVES

"New aircraft and operational procedures on their own won't get you to carbon-neutral growth," says Mills, adding that alternative drop-in fuels are needed to bridge the gap. However, in addition to financial backing from investors, government incentives are necessary to prevent what is essentially an industry in its infancy from falling at the first hurdle.

"Globally you're looking at a very new industry and set of technologies. As with many new industries, they come across a valley of death," says Mills. "Governments play a huge role in helping to cross that valley of death. The fuel has been demonstrated – the economics in getting that scale up are now key."

But he adds that alternative fuel is "more expensive, supply is limited and, in certain circumstances, the economics mean the refiners are more likely to focus on ground transportation fuels rather than aviation".

Boeing's short-term goal, says Mills, is to catalyse the scaling up of the alternative fuel supply chain to reach 1% of global jet fuel demand by 2016. But this is a mere drop in the ocean. Longer-term, a 10% figure is "achievable" by 2020, says LanzaTech's Holmgren, but only if there is "the will".

The speed at which the biofuel market develops "depends on the level on investment", including the introduction of government incentives such as those offered in the USA, says Mills. "We're close – we're almost there. Now is the critical step." ■



Virgin Atlantic plans to fly using the fuel within a year

AERODYNAMICS

The shape of things

A NASA project to prove the viability of a hybrid wing body featuring a new type of composite structure is making progress

STEPHEN TRIMBLE WASHINGTON DC

NASA's dream aircraft design – the hybrid wing body – promises generational leaps in fuel efficiency and reduction of harmful emissions compared with modern airliners and military transports.

But there's one major problem: it is impossible to build a hybrid wing body using existing structural materials.

Unlike a conventional tube-and-wing design, the pressurised section of a hybrid wing body is neither circular nor oval. The payload section is more like a square or a rectangle. Those are awkward shapes to pressurise, testing the mettle of the strongest laminated composites in production today.

The hybrid wing body also poses a unique architectural challenge. Manoeuvre loads on a tube-and-wing design are distributed generally in one direction along the supportive stringers that run from the nose to the tail. The hybrid wing body distributes the same loads in two directions: nose to tail and wing-tip to

wing-tip. The same arrangement of length-wise stringers and span-wise frames is too weak to support a hybrid wing body.

NASA officials believe a single concept can solve both problems. However, that solution – the pultruded rod stitched efficient unitised structure (PRSEUS) – requires reinventing how composite structures are designed and manufactured for aircraft.

"That was the motivation behind all of this: try to come up with a way to build an efficient structure and pressurise for an airplane that's not traditional," says Fayette Collier, NASA's manager of the Environmentally Responsible Aviation (ERA) project.

"As time goes by, Boeing engineers are looking at it and seeing the value of it"

DAWN JEGLEY

Aeronautics researcher, NASA

Since 1990, NASA has invested \$123 million to turn PRSEUS into a physical reality. On 12 December, the NASA Super Guppy – a Boeing C-97 modified to carry outsize cargo – arrived at the agency's Langley Research Center in Virginia carrying a PRSEUS fuselage cross section for a hybrid wing body. Weighing 4,540kg (10,000lb) and 9.14m (30ft) wide, the section will allow NASA to perform the first pressurisation tests on a PRSEUS structure.

In some ways, the testing comes a few years too late. The lack of a validated PRSEUS

structure partly doomed a proposal within NASA to build a 737-sized hybrid wing body called XVT to serve as a flying demonstrator.

"This was one of the reasons [the XVT] was held up," Collier says. "We didn't have the structure proved out. So this is the proof of the structure that will be needed to build a vehicle."

PRIORITIES

A full-sized hybrid wing body demonstrator is no longer on the list of NASA aeronautics research priorities, but the test results may have other applications. One of the agency's ambitions is to thrust PRSEUS and the wider concept of stitched composite materials into the mainstream of military and commercial aircraft production.

It can take decades to introduce a new material system in the aviation industry. And it starts with a tiny step. A few years ago, the US Air Force decided the landing gear doors on the C-17 were too damage prone, so they decided to replace them with a stitched composite across the fleet.

"It's secondary structure, but that's perfect," says Dawn Jegley, a NASA aeronautics researcher. "The development efforts we're going through will lead us to primary structure."

Making a traditional composite structure begins with a fabric tape that is pre-impregnated with an infused epoxy resin. The tape is layered onto a form mould into the desired shape or thickness, then usually cured in an autoclave. The tape must be cured within a certain amount of time or the infused epoxy expires. »



The US Air Force replaced its C-17s' landing gear doors with a stitched composite

» A stitched composite is made very differently. A dry fabric is placed into a tool. An advanced sewing machine then stitches Vectran fibre into the fabric. The stitched fabric is then moved into an autoclave and heated. At peak temperature, a vacuum-assisted transfer process – dubbed the controlled atmospheric pressure resin infusion process (CAPRI) by Boeing – infuses the resin into the fabric.

That process removes complications of expiring epoxy, including size restrictions for the part. “In the long run what we’d like to be able to do is build, say, the entire upper cover of the centre section, or the entire upper cover of the wing in one place so you don’t have to do any splices,” Jegley says.

For the hybrid wing body design, NASA combined the stitched composite structure with a pultruded rod to solve the bi-directional manoeuvring loads. The rod is made of stiff graphite fibres lined up in a single, or unidirectional, direction. “It gives you kind of an I-beam effect,” Jegley says.

BROADER HOPES

The initial goal of the PRSEUS programme is to support the hybrid wing body design, but NASA officials have broader hopes for the technology. The same manufacturing process and strength benefits could be applied to conventional tube-and-wing aircraft designs.

“I think it is directly applicable to circular fuselages,” Collier says. “In the case of the 787 there were still a lot of rivets used to put it all together. The outer skin is like a piece of black aluminium. It’s old-style construction techniques, and this is a more modern approach to building the structure.”

A few years ago, the US Federal Aviation Administration funded Boeing to build stitched composite panels for a conventional fuselage. The panels stopped short of creating a



A PRSEUS fuselage cross section arrived in Langley in December for pressurisation tests

“That was the motivation: try to come up with a way to build an efficient structure”

FAYETTE COLLIER

ERA project manager, NASA

complete structure that could be tested. As the PRSEUS programme supporting the hybrid wing body nears an end, NASA’s next step is to apply the structure to a conventional aircraft.

“People have talked about building that circular fuselage,” Collier says. “We have facilities here at Langley. [The test structure] would be 30ft long, it would be circular, it would have windows, it would have the floor built into it and the substructure and all that.”

Such a test, if funded, would validate that a PRSEUS structure can be adapted to pressurise a conventional fuselage, which poses far less of a challenge than a hybrid wing body. Then, the next challenge will be for NASA to persuade Boeing’s commercial aircraft design-

ers to use PRSEUS as a primary structure in a future airliner.

Jegley is optimistic that Boeing’s engineers are warming to the concept. “As time goes by, Boeing engineers are looking at it and seeing the value of it,” she says. It could still be decades, however, before the technology migrates into commercial industry.

In a statement released to *Flight International*, Boeing declined to speculate on the timeline for introducing PRSEUS into commercial aircraft production.

“Boeing believes the concept could be developed in the next 15 to 20 years for military applications, such as aerial refuelling and transport applications,” the airframer says.

Despite NASA’s 20-year-old effort, there is still much work left to do to make PRSEUS available for primary, load-bearing structures on certificated aircraft.

REQUIREMENTS

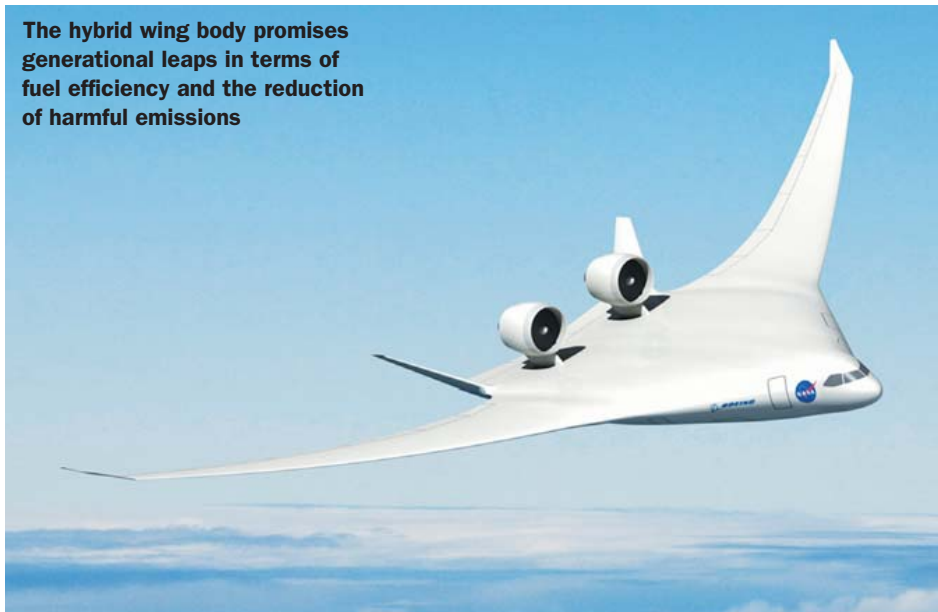
The NASA project, for example, has defined some of the material design requirements for the PRSEUS structure, but not enough to satisfy the FAA’s certification standards.

Boeing “may tweak the materials a little bit”, Jegley says. “They may tweak the resin a little bit compared to where it is today.”

Another issue that must be studied is lightning strike. Unlike aluminium, composite material is not naturally conductive. A traditional composite structure, such as a 787 fuselage barrel, includes a layer of wire mesh that acts as a Faraday cage and channels electrical energy into lightning rods.

“We have not looked at lightning strike all that much yet,” Jegley says. “Lightning strike is one thing that Boeing is working on. Right now, Boeing’s idea is you’d have to do so something like you do now, which is not really efficient. What we’d like to do is figure out a way to combine [the wire mesh] with the stitched structure so you could eliminate having to do it after the fact and add weight. We’re not there yet, but it’s another step along the way.” ■

The hybrid wing body promises generational leaps in terms of fuel efficiency and the reduction of harmful emissions



From yuckspeak to tales of yore, send your offcuts to murdo.morrison@flightglobal.com

Let's hear it for plane English

Test pilots – particularly those who cut their teeth in the military – are famously fond of using acronyms and jargon wherever possible.

So it was refreshing indeed to hear the man usually found at the controls of the Textron AirLand Scorpion demonstrator taking more of a plain-English approach at a recent lecture. For example, describing the engineering challenge of where best to position the aircraft's numerous cockpit displays, chief TP Dan Hinson says: "We moved things like we were playing Mr Potato Head."

And what term did the Scorpion team adopt for a full-scale wooden cockpit model, which is used to support such engineering activities? No three-letter acronym needed here – it's simply the "Mockpit", he says.

Oh, chute!

Another pilot has reason to be thankful for the parachute Cirrus fits to the back of its SR22 piston single, after he ran out of fuel 220nm (400km) from Hawaii.

You would think that when setting off from California to fly halfway across the world's biggest piece of water, the first and last thing you would do is check you had enough juice in the tank – there not being too many FBOs in the Pacific Ocean.



"Maurauding acronyms at one o'clock, Hoskins!"

The pilot did alert the authorities to say he had 3h of fuel left, and they guided him to ditch close to a cruise ship that was in the area.

After the SR22's propeller finally cut out, he deployed the parachute and floated gracefully to the sea. The pilot then exited the aircraft onto a life raft and was shortly after picked up by crew from the ship.

A US Coast Guard C-130 co-ordinated and filmed the rescue, which you can watch on flightglobal.com/sr22ditching

Cirrus says it is the 51st time its parachute has been deployed "resulting in 104 persons returning safely".

This is more than can be said for the SR22 which, according to the US Coast Guard's website, was "last observed partially submerged".

Not Mikoyan well

From the not remotely funny, but quirky enough files:

News reaches us from India of a freak accident involving two of the world's most dangerous modes of transport – a Mikoyan fighter and a motorcycle.

"A MiG-27 crashed in Mahabar village, 4km from the Barmer district of Rajasthan," says a report from local news agency NDTV. "The plane crash landed on a passing motorcycle, injuring the rider."

The Indian air force confirms the pilot ejected safely.

Macada-mania

Warning to Korean Air cabin crew: don't serve passengers macadamia nuts in a bag instead of a bowl, especially if they are the former customer service vice-president, daughter of the chairman, and the owner, it seems, of a furious temper.

Cho Hyun Ah – the now former Korean Air executive – went nuts after the breach in pre-flight nibbles protocol and ordered one of the airline's aircraft back to the New York Kennedy terminal after it had begun taxiing.

She has gone on trial in Seoul for violating aviation law, among other things.

Just as well it was only macadamias. She could have been almond and dangerous.

Mechanic's menu

The quaint menu on Christmas Day of the Mechanics' Mess of

100 YEARS AGO

the Royal Flying Corps. Joints: Turkey a'la Dardanelles,

Chicken la France, Beef a'la John Bull. Sweets: Xmas pudding (no tanners inside). Wine: Vin d'hops, Eau de pop.

Stuff the railways

Ten years ago railroad kings used to gloat because people

75 YEARS AGO

had to stuff cotton wool into their ears before flying, and it was

no real answer to point out, as I frequently did, that they (the railway companies) ought to issue their passengers with cotton wool to stuff into their eyes on account of the grit, coal, coke and cinders which poured in at the carriage windows.

Equal opportunity

Sir – In a recent issue of *Flight* an advertisement for air traffic

50 YEARS AGO

control assistants for East Midlands airport stated that only male ATCAs

would be given the opportunity to obtain ATC licences. Surely a new airport should have more go-ahead ideas and give equality of opportunity to both male and female staff?

Hubble hold-up

The launch of the Hubble space telescope by Space

25 YEARS AGO

Shuttle *Discovery* has been delayed by almost a month. Hubble

has been bedevilled by Shuttle-related delays. The telescope was originally scheduled to be launched in 1984.

FG

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Water lucky chap: pilot prepares to wave goodbye to his SR22

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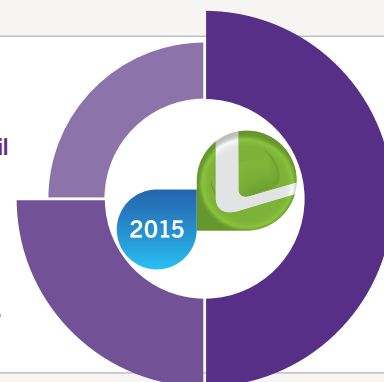
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Istanbul, Turkey
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18-22 February

Aero India
Air Force Station Yelahanka, Bengaluru
aerindia.in

24 February - 1 March

Avalon Airshow
Geelong, Australia
airshow.com.au

17-20 March

**Asian Ground Handling
International Conference**
Conrad Hotel, Macao
groundhandling.com

23-24 March

Operating Lease Masterclass
Park Plaza County Hall Hotel, London
everestevents.co.uk/events

25 March

European Corporate Aviation Summit
The Broadgate Tower, London
aeropodium.com

20-23 April

AeroDef Manufacturing
Hilton Anatole, Dallas
aerodefevent.com

24 April

Skytech
Business Design Centre, London
skytechevent.com

29-30 April

Loyalty@Freddie Awards
Atlanta, USA
flightglobalevents.com/
loyaltyfreddies2015

4-7 May

AUVSI's Unmanned Systems
Atlanta, USA
auvsishow.org

10-11 May

Aviation Africa
Dubai, UAE
aviationafrica.aero

17-20 May

ALTA CCMA
Punta Cana, Dominican Republic
alta.aero/ccma

19-21 May

EBACE
Geneva, Switzerland
ebace.aero/2015

26-28 May

AP&M Europe
Olympia London, UK
apmexpo.com

31 May - 3 June

**1st International Symposium on
Sustainable Aviation (ISSA)**
Istanbul, Turkey
issasci.org

4-6 June

France Air Expo
Lyon-Bron airport, France
franceairexpo.com

15-21 June

Paris Air Show
Le Bourget, Paris
siae.fr



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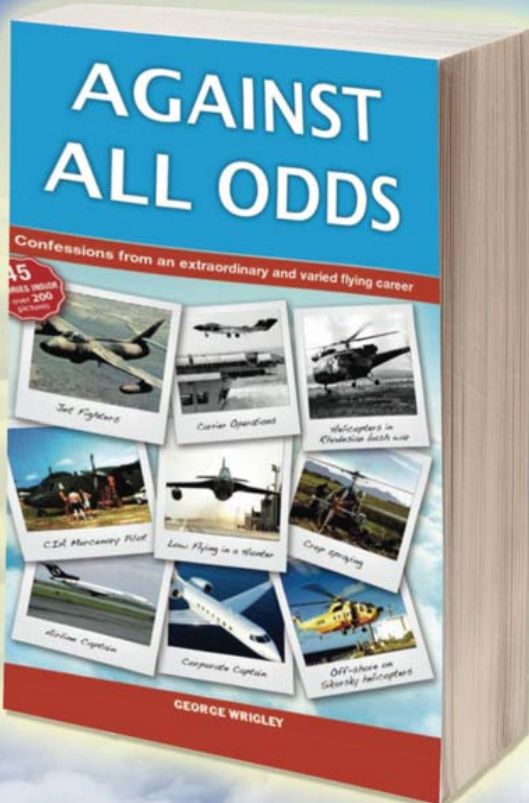
A Boeing 747-400 has landed at St Athan Aerospace Business Park, it is the first time a Boeing 747, or civil plane of this size has ever landed at St Athan. As one of the most recognisable aircraft in the industry, it arrived at the former RAF airbase last week, after a six and a half hour flight from North Kentucky international airport in the US.

This 21 year old Aircraft was the 1000th Boeing 747 to be manufactured. until landing last week, the aircraft has been most recently used as a freighter with the US Airline Southern Air Transport.

The 230 tonne aircraft will now be parted out, all parts are now available for sale, lease, or exchange. For more information please contact: Linzi Roberts on 01403 711444 or email: Linzi@casco.aero



Added to our Inventory of B737CL/NG, 747 and 767's recently parted out.



Pilots and flying enthusiasts will enjoy this book of forty five stories by George Wrigley, taken from his extraordinary and varied forty year flying career. It is written in a racy style describing experiences, incidents, accidents and numerous narrow escapes as he progressed from his initial training in the Royal Rhodesian Air Force where he became a jet fighter pilot on Hunters, to flying Sea Vixens off HMS Victorious in the Royal Navy Fleet Air Arm. After returning to Rhodesia he flew Hunters, before becoming a Weapons and Flying Instructor. During the Rhodesian bush war, he flew Alouette helicopters on No 7 Helicopter Squadron.

After leaving the Air Force, he did stints crop spraying in both Rhodesia and the Western Cape in South Africa, flying a 47 Bell helicopter. He next qualified as a captain on Sikorsky helicopters doing off shore work to vessels rounding the Cape of Good Hope. He soon took the opportunity to spend an exciting year flying for the CIA from an island in the Caribbean dropping night supplies to the Contras in Nicaragua. When this contract ended, George returned to fly corporate jets for the President of Bophuthatswana and went on to become an Airline Captain in South Africa.

The stories are full of humour, romance and interesting characters he met along the way. It has good descriptions of hands on flying and also relates foolhardy escapades which he survived against all odds. It is packed with over 200 pictures to enjoy.

It is available via Kindle download or as two versions of hardcopies through Amazon at the following hyperlinks:

<http://www.amazon.com/dp/B00KFCJGVC> or

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- Provide three references

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If you meet the above requirements and wish to apply, please submit your CV at recruitment@asiaatlanticairlines.com.

Note: In the Email Subject Line Place, "Captain Position".

Also, send the items below, properly orientated and readable.

1. CV, containing a passport size color photo.
2. Color copy of passport.
3. Color copy of pilot licence, front and back.
4. Color copy of current English proficiency.
5. Copy of medical certificate.
6. Copy of last three flying months of logbook.
7. Copy of last simulator training session.
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Sick Days: 30 days per annum with doctor's certificate

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Hotel Accommodation: 10 nights at company expense.

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Director of Safety Regulation

The Irish Aviation Authority oversees the safety and security of Irish Civil Aviation, provides air traffic management (ATM) services in Irish airspace and at State Airports and communication services on the Eastern North Atlantic. The IAA receives no funding from the State and circa 80% of our income is earned from international business.

The Authority is dedicated to providing a working environment that encourages high performance, is developmental and supportive for all our people and committed to maintaining and improving services to our customers on a cost effective and efficient basis while prioritising Ireland's excellent aviation safety record.

We wish to recruit a Director of Safety Regulation. The successful candidate, who will be a member of the Executive Group, will be responsible for the efficient and effective management of the Safety

Regulation Directorate and will play a key role in regulating Civil Aviation standards; maintaining all national and international standards as required; developing divisional strategy and planning for future safety developments.

Ideally the candidate should have an appropriate third level qualification; possess detailed knowledge of safety regulation within the aviation sector; have significant experience and knowledge of EU, national and international safety regulatory legislation and standards.

Candidates should have at least 15 years working within the Aviation Industry, with at least five years working at a senior level, as well as a clear understanding of the international regulatory environment.

A Job Description can be obtained from www.iaa.ie.

If you have the necessary skills and competencies for this position then we would like to hear from you. For general queries, please contact Brendan Mulligan at +353 1 6031535, e-mail brendan.mulligan@iaa.ie.

Applications, including details of career to date and a brief outline of how your skillset meets the requirements for the position, should be sent in strict confidence to:

**Brendan Mulligan, Director Human Resources,
Irish Aviation Authority, The Times Building,
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WORK EXPERIENCE ROSEMARY LEONE

Fuelling the best service at FBOs

As the director of programme development at Phillips 66 General Aviation, Rosemary Leone says customer relationships, pilot support and reliable deliveries are as vital as the make-up of the product her firm sells

How did you get started?

My first aviation “job” was as a co-owner of a flight school. My business partner and I opened it in 1999 with the focus on providing flight training in newer technology aircraft. Most flight schools in our area offered training in 30-year-old planes – we offered training in new aircraft straight from the factory. Of course, this meant we spent weekends and some evenings at the airport, but this worked well with our customer base, who also worked on weekdays.

Prior to Phillips 66 I worked at Caterpillar and IBM, in both cases in technical sales positions or sales management. I came to work for Phillips 66 after I heard about the available regional sales representative role through a contact I had made from racing airplanes cross country. To prove that aviation is a small world, I had met my Texas contact because I knew her mother from participation in The Ninety-Nines, an international organisation of women pilots.

What are your current duties?

I work with programmes that Phillips 66 offers for our branded fixed base operators, including our loyalty programme, Wing-Points, our credit cards and card processing, our rebate programmes for pilots and handling many of the day-to-day questions that come in. I also work with our Advisory Council, which is a group made up of owners or managers of our FBOs to review current and potential pro-



Phillips 66 General Aviation

“Relationships are key differentiating factor in the fuel supply business”

grammes. Our council also provides good insight to Phillips 66 as to what they see as the direction for FBOs going forward, what new inhibitors to their business they see on the horizon, and what Phillips 66 can do to help them.

Do you miss anything after your last promotion?

After spending seven years as a regional account manager, the most difficult part of the job is stepping away from that role – with that role you have the opportunity to really learn the customer’s business and work with them daily. I also miss the more personal connection with pilots that I was able to have when I

was at airports constantly. Although I live on an airpark, I don’t get to speak to the same cross-section of people I was able to in the past.

There’s certainly a lot of heritage behind you

Phillips 66 has been in the aviation fuels business for over 85 years, and we look forward to supplying quality fuels to our FBOs and to customers into the future. We have specialists not only from the general aviation team but from our technology centre, lubricants teams and supply organisations looking at how to ensure we can continue to deliver clean, on-spec fuel to the aviation industry.

What’s your latest project?

We always have projects going on, looking at new technologies that can be used with our FBOs and to ensure that we continue to provide a secure supply of fuel to our customers. The most recent project that we concluded was rolling out new credit card offerings to our fuel consumers. These new offerings provide rebate opportunities to our cardholders to help keep flying affordable. Phillips 66 is also actively working with the US Federal Aviation Administration on the Piston Aircraft Fuels Initiative, which is looking at alternatives to aviation gasoline.

How is one fuel supplier different than the next?

Fuel products sold for the aviation industry all must meet the same technical specifications, so the differences among fuel suppliers aren’t about the fuel products, but instead are about what the fuel brands offer to the FBO and to the consumer. We differentiate based on ensuring secure, on-spec fuel supply, on the programmes we offer the pilots and the FBOs, and on the relationships we have with our customers. ■



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